THE Ropemakers OF PLYMOUTH

THE ROPEMAKERS OF PLYMOUTH

A History of the Plymouth Cordage Company 1824–1949

Some Books by Samuel Eliot Morison

The Maritime History of Massachusetts

Builders of the Bay Colony

Three Centuries of Harvard

Admiral of the Ocean Sea: A Life of Christopher Columbus

Portuguese Voyages to America before 1500

History of United States Naval Operations, World War II

Vol. I The Battle of the Atlantic, 1939–1943

Vol. II Operations in North African Waters, 1942–1943

Vol. III The Rising Sun in the Pacific, 1931–1942

Vol. IV Coral Sea, Midway and Submarine Actions, 1942–1943

Vol. V The Struggle for Guadalcanal, 1942–1943

View of the Plymouth Cordage Company in 1874.
Schooner unloading bales of fiber; the ropewalk is at right; brick, slate and field mills at left.

THE Ropemakers OF PLYMOUTH

A History of
the Plymouth Cordage Company
1824-1949

by

SAMUEL ELIOT
MORISON

The Riverside Press Cambridge
HOUGHTON MIFFLIN COMPANY BOSTON
1950

The Riverside Press
CAMBRIDGE · MASSACHUSETTS
PRINTED IN THE U.S.A.

PREFACE

Visitors to Plymouth, Massachusetts, may have noticed a flourishing manufacturing plant on the shores of the harbor, some two miles north of Plymouth Rock. These are the buildings of the Plymouth Cordage Company, founded on that spot in 1824. In view of the mortality of American manufacturing concerns, it is no small wonder that this company has managed to survive three great wars, five major depressions and sundry financial panics, to have maintained its integrity through eras of cutthroat competition and octopus-like combinations; and to have grown with the country to become the largest producer of cordage in the world today. All this under essentially the same sort of management, with no bankruptcy or financial reorganization and only one major strike. To every challenge that time and circumstance have hurled at the Plymouth Cordage Company, it has replied bravely and effectively.

This short history is in a sense a by-product of the secular friendship between the Loring and the Morison families. It was authorized by the Company to commemorate its one hundred and twenty-fifth birthday, but the author alone is responsible for the facts. Basic research in the Company's archives and elsewhere was done by Dr. Winston B. Lewis of the Department of English, Government and History at the United States

Naval Academy. The actual writing was done by the undersigned, who may be described as a contented consumer of Plymouth cordage since his first cat-boating in the last century. He offers it to the public as an illustration of what can still be accomplished by Yankee shrewdness and ingenuity when implemented by integrity.

If he were to place in a nutshell the history of the Plymouth Cordage Company, he would use a line of a well-known college song:

"Calm Rising Through Change and Through Storm."

S. E. MORISON

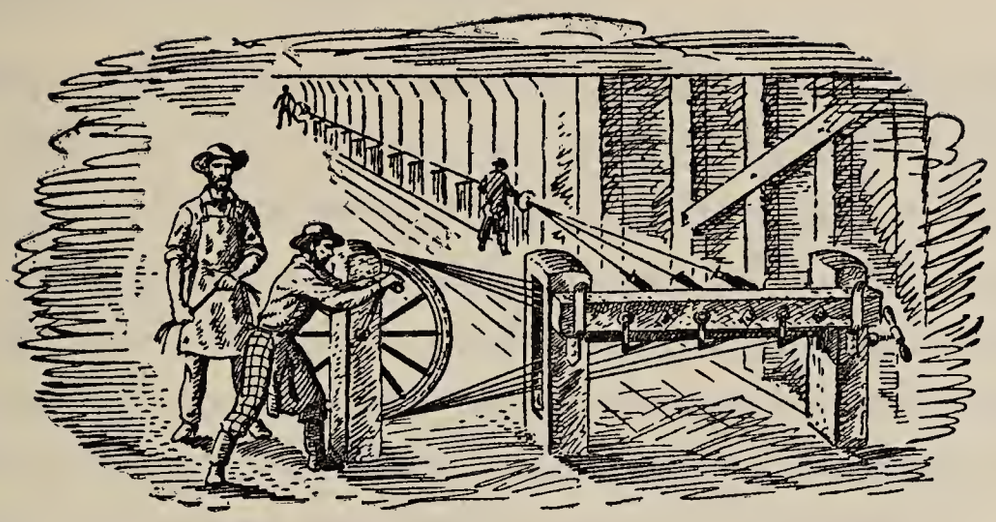
Harvard University
4 November 1949

CONTENTS

LIST OF ILLUSTRATIONS

THE ROPEMAKERS OF PLYMOUTH

A History of the Plymouth Cordage Company 1824–1949



I. THE FOUNDING, 1824–1826

Bourne Spooner Comes Home

On Saturday, 9 December 1620,* a band of ten Pilgrim Fathers in search of a suitable place to pitch their settlement entered Plymouth Harbor in their shallop during a snow squall, and after a wet and miserable night ashore "found themselves to be on an island secure from the Indians, where they might dry their stuff, fix their pieces and rest themselves; and gave God thanks for His mercies in their manifold deliverances." After resting the Sabbath on Clark's Island, on Monday 11 December* "they sounded the harbor and found it fit for shipping, and marched into the land and found divers cornfields and little running brooks; a place (as they supposed) fit for situation; at least it was the best they could find, and the season and their present necessity made them glad to accept of it." [1]

* Old style date.

[1] Bradford's *History of Plymouth Plantation*, end of chapter x.

One of these "little running brooks," later called Nathan's from the name of an early settler, became the site of the Plymouth Cordage Company about two centuries later. The mouth of Nathan's Brook may well be the exact spot where these exploring Pilgrims first landed; it was certainly the nearest land they could have reached in their shallop without running on mudflats. Anyone who enters Plymouth harbor in a small boat can see for himself that the "Cordage Wharf" is much easier to reach than the wharves of Plymouth Town. However, we shall leave the Plymouth Rock tradition unchallenged. Wherever the exploring party landed, the Pilgrim band as a whole decided to settle at the mouth of Town Brook, two and a quarter miles to the southward.

When a colonial New England village expanded and a group of houses was built on the outskirts of a township, the new hamlet was often given an informal and humorous name before it acquired an official one. Thus the few houses which grew up around the water-powered grist mill on Nathan's Brook in colonial days were collectively called "Playne Dealing" in the records, a name which has been "a puzzle to the student of Pilgrim history." [2] The implied compliment to the local inhabitants apparently wore thin in course of time, since we find that around the year 1800 the place was known as "Bungtown." Possibly the inhabitants whittled out barrel bungs in their spare time;

[2] William T. Davis, *Ancient Landmarks of Plymouth*, p. 346.

perhaps they were noted for extracting the same from full barrels. A later and sentimental age called it "Seaside." Around the turn of the twentieth century the sensible name "North Plymouth" was adopted. That is the present name and address of this section of the ancient Town of Plymouth where the cordage plant and its dependent wharves, sidings, offices, employees' houses and other buildings are situated.

Bourne Spooner, descendant of several Pilgrim Fathers, was the father of the Plymouth Cordage Company. Born in Plymouth 2 February 1790 and there educated, he left home as a young man during or immediately after the War of 1812, for the booming city of New Orleans. There he was employed in a ropewalk which used Kentucky hemp for raw material and Negro slaves, hired from their masters, for labor. Young Spooner was a natural abolitionist. He hated slavery as an institution, and the inefficiency of slave labor disgusted him. Consequently, after learning the ropemaking business, he returned to his home town determined to make a try at manufacturing cordage with free labor.

The time was propitious and the place suitable. New England had recovered from the post-war depression; trade, shipping and manufacturing were flourishing. Congress in May 1824 raised the tariff to four cents a pound on tarred, and five cents a pound on untarred cordage. Plymouth Bay was no mean port in 1824, although the three towns (Plymouth,

Kingston and Duxbury) that front on that large body of water inside Saquish and Long Beach were prevented by deep embayment, intricate harbor channels and lack of inland communication from keeping pace with Boston and Salem. Here fishing schooners, coasting sloops and foreign-going brigs and ships up to 500 tons' burthen were built. In 1820 some 21,000 tons of shipping were registered in the Plymouth customs district, more than in Gloucester or Newburyport and not far behind Nantucket or New Bedford. Plymouth-owned vessels were active in the triangular trade in sugar, iron and hemp from Boston to Havana, thence to Russia and back to Boston; others traded to the Mediterranean or the West Indies; but most of them were coasters. For this was before the railroad era, when anyone who went anywhere from Plymouth or sent to Plymouth for anything, generally went or sent by sea. In 1830, when the town still had less than five thousand inhabitants, it employed six sloops of 60 tons each as Boston packets, two schooners of 90 tons each as "constant traders" to Nantucket, New Bedford and New York; and three other vessels to bring lumber and firewood from Maine.

In addition, the district annually fitted out over a hundred vessels for the cod and mackerel fisheries and even owned a few whaling ships that sailed to the Pacific and back. In the interior of Plymouth County, around Bridgewater, there was a flourishing iron in-

dustry where anchors, shovels, nails and bolts were made; and the county boasted seven woolen and fourteen cotton mills.

Ships and Rigging

While every factory and home in New England required a certain amount of rope, it was the maritime market that Bourne Spooner dreamed of capturing. The modern sailor or yachtsman can hardly imagine the amount of line that was consumed on a nineteenth-century sailing vessel. Every sail (a full-rigged ship carried at least fifteen, a barque twelve and a brig nine) had to be edged all around with boltrope. The yard to which it was bent — with rope — needed stout lifts or halyards to be raised and lowered. Two tacks and two sheets were required to trim each square sail; two bowlines to keep the leeches taut; two clewlines, two buntlines and two leechlines for clewing it up to the yard for furling; and the sailors needed a footrope to stand on. The several jibs and triangular staysails between the masts, the fore-and-aft driver on the main and spanker on the mizzen, and the studdingsails if studdingsails were carried, had their own halyards and sheets, topping lifts or brails. Most of this running

rigging ran up and down masts that might be 50, 60 or 100 feet tall, and those that did the heaviest work had double or triple purchases at the ends for swaying them up taut. In addition there was the standing rigging, the shrouds and backstays that held up the lower masts, topmasts and topgallant masts, all of heavy tarred rope, neatly wormed and served with small line, together with the rope lanyards that enabled them to be set up or slacked away; for wire rigging did not come into use until after the Civil War. Chain cable was introduced somewhat earlier, but until 1840, at least, every ship needed several heavy rope anchor cables 120 fathoms in length, and these cables consumed an enormous amount of fibre. Frigates like the *Constitution*, for instance, carried seven cables 21 inches in circumference, which is the size of the largest cable ever made by the Plymouth Cordage Company.[3] Then there were the dipsey lead lines, the spare tackles, handy-billys and cargo hoists; downhauls, painters, flag halyards and boat ropes; hawsers, jeers, shank painters and a dozen other lines now obsolete; ratlines to enable seamen to go aloft on the run, and gaskets with which they secured a furled sail; and the one, two or three rows of short reefpoints on almost every sail. All of rope.

If you consider the hull as a ship's body and the sails her means of locomotion, the "lines," as seamen called

[3] Illustration as frontispiece to the 1949 Catalogue. At the Charlestown Navy Yard ropewalk a length of 25-inch cable for a ship of the line is preserved.

the ropes, were her nerves and tendons. The wind blowing on this intricate network of cordage made a deep humming noise in a fresh gale and a high-pitched whistle in a storm; halyards slatting against the spars provided the woodwind, the sails spilling wind and then filling out with a hollow boom were the percussion instruments, and the rush of great waters the organ accompaniment, in a symphony of sound that was music in a seaman's ear. Even in the lightest air there was music of a sort from spars creaking and the reef-points tap-tap-tapping against the duck sails. There's nothing like this to be heard today, even in a modern sailing yacht, whose wire rigging twangs and snaps like a sick piano.

The Art and Mystery of Ropemaking

The twisting of fibres into rope is one of the oldest of the arts. The Egyptians and the Chinese did it; the American Indians and the Polynesians did it; the Romans and the Greeks and the Anglo-Saxons did it. Boston imported a ropemaker from England as early as 1641; by 1794 there were fourteen ropewalks in that town alone; by 1810 there were 173 ropewalks in the United States. But competition constantly reduced their numbers, while output increased.

Before we go further, a few definitions and elemen-

tary facts for the uninitiated are in order; and if you can lay hands on a bit of rope and unlay (i.e., untwist) it, so much the better. A typical piece of rope, you will find, is composed of three *strands*. Now unlay one strand and you will find it to be composed of a number of *yarns* (called *threads* in the trade). Untwist one rope-yarn, and you reach the ultimate; a multitude of *fibres*. This fibre, when Plymouth Cordage was founded, could be either Russian hemp or American hemp. Later it might be abaca (better known as manila), henequen or sisal, cotton, and now, nylon. The chances are that the piece of rope you are playing with is made entirely of manila. You will also observe that rope is built on the principle of opposing twists; the fibre is twisted right-handed into the yarn, the yarns left-handed into the strand, and the strands right-handed into the rope; or, vice-versa.

Now, having "unlaid" our rope with its three diminishing constituents (strand, yarn and fibre), let us start at the bottom and build it up again. The essential processes of ropemaking are the same now as in 1824, although machines have immensely speeded up every process. The fibre, purchased in great bales as it came from a warehouse on the Baltic or a "hemp mill" in the American West, first had to be *hackled*. This was a process like combing a lady's long hair. An instrument known as a hatchel or hackle, which resembled a huge, iron-bristled hairbrush, was used to comb the fibre out

straight, and at the same time remove dirt, knots and broken pieces.

Every subsequent operation, except the tarring, had to be performed in a ropewalk when Plymouth Cordage was founded. Originally a ropewalk was a level yard or field marked out with a series of pegged posts on which the yarn, strand or rope was hung as fast as it was spun, formed or laid. The vagaries of New England weather required ropewalks to be covered, and by 1824 these long wooden sheds with square windows, resembling a modern "roadside diner" pulled out to thirty times its length, were familiar features of almost every seaboard town. There were already one or more in Plymouth in 1824. Owing to the use of tar in ropemaking, ropewalks frequently burned down and selectmen were always trying to push them out into the country. In Boston, for instance, the principal ropewalks in 1819 were on the edge of what is now the Public Garden. After the third big fire that year, they were rebuilt in the suburbs. The Charlestown Navy Yard still operates a stone ropewalk built in 1831, but only the Navy could afford to build with stone.

Spinning was accomplished by the spinner securing a bundle of hackled hemp around his waist and with thumb and fingers deftly "teasing" (i.e. feeding) it into a rope-yarn, while a boy at a large spinning wheel imparted the necessary twist. The spinner walked backward down the walk as he spun the yarn; experts

could spin two yarns simultaneously, one with each hand. And the single spinning wheel drove half a dozen whorls, so that one boy might supply the power for more than one spinner.

Rope-yarn, when made of hemp fibre, had to be treated with tar to protect it from the weather. Hand-spun yarn was easily gathered into loose strands called *junks* for tarring.

After being tarred and seasoned, the yarn was ready to be *formed* into strands. This was done on the *forming ground* of the ropewalk. Bobbins containing the yarn for the strand were placed on a rack at one end of the ground. The yarn from these was led through holes in a plate, arranged in a series of concentric circles. The plate insured that the yarns fed out evenly and at the proper angle. After passing through the plate, the yarns were pulled through a tube which compressed them into one round mass, after which the forming machine twisted them into a *strand*.

In the early days at Plymouth, power for the *forming machine* was supplied from a water wheel to a shaft and endless rope running the full length of the walk and passing around a driving wheel on the machine. The machine itself, a truck resembling a railroad hand-car, ran on rails the length of the forming ground. As the yarns were twisted into the strand, the truck moved slowly backward, pulling more yarn from the strand tube and twisting it as it pulled. A forming machine

might be able to form as many as six strands at once. These strands, as formed, were laid parallel, separated by pegs, on wooden arms attached to posts on the walk, where they were readily available to the *laying ground*, which was the other longitudinal half of the ropewalk.

Laying the strands into rope is the third and final process of ropemaking. The laying gang takes three or more strands, according to the type of rope wanted, and parts them out parallel to their full length. Since laying them into rope shortened them, strands for a hundred fathoms of rope had to be approximately 125 fathoms long. At one end of the walk these strands are secured to the forelock of a *laying machine*, a truck similar in appearance and operation to the forming machine, whose function was to twist the strands into rope. Since rope is built on the principle of opposing twists (strands formed in one direction, rope in the other), the laying process tended to untwist the strands. To prevent this, each strand was fastened at its other end to a separate forelock of a *foreturn machine*, which kept each one revolving in order to prevent it from being untwisted by the action of the laying machine at the opposite end of the walk.

Although modern machines, occupying a comparatively small space and requiring no walk, now perform all these processes, the basic principles are the same as in ropewalk days. And the old ropewalk was used almost continuously down to 1945, either because some

conservative customer insisted on "walk-laid rope" for extra-large sizes, or for special orders. Setting modern machines for non-standard sizes takes time, but the simple carriages and other devices in the walk could be quickly set and were always ready for use. As Mr. Thomas F. Cavanaugh, the retired overseer of the walk, remarked to the writer, "We could get an order in the morning, turn it out on the walk, and have it on the afternoon train."

There are of course many varieties of rope — three- or four-strand, with or without a heart rope, hard or soft lay, etc. — and many sizes within each variety manufactured by Plymouth Cordage today. A hard-laid or tightly twisted rope is stiffer and has more elasticity. A soft lay is stronger and easier to handle. The purpose determines which lay is better; thus, a cowboy's lariat is a hard lay, but boltrope for sails is a soft lay.

A broader classification would be that between common- or hawser-laid rope and cable-laid. A common-laid rope is the type in general use, which we have been describing. It is made by laying strands. A cable-laid rope is made by laying complete ropes — a rope made of ropes. Cable-laid is actually less strong than hawser-laid of the same diameter, but has greater elasticity and greater resistance to abrasion. Hence it is preferable for some purposes, such as anchor warps and well-drilling ropes.

Twine is another kind, related to cordage but not classed as such. Binder and baler twines are single yarns not very different from the yarn which is formed into strands for rope. Tying twines may be single or consist of several yarns. Sisal and henequen are the most common fibres for baler, binder and tying twines, but manila may be used when an exceptionally strong twine is desired.

In the old days, maximum length of the coil of rope which could be made in one piece was determined by the length of the walk. Because of the twisting, the finished rope was shorter than the strands which went into it, just as the strands were shorter than the yarns of which they were composed. At Plymouth where, in Spooner's day, the over-all length of the walk was 175 fathoms, the maximum length of a coil was about 100 fathoms. "There is no ropewalk in New England," wrote Spooner in 1850, "that can furnish 150 faths. length in one entire piece."

Rope has always been sold by weight, whether wholesale or retail. Rope used always to be designated by its circumference. In 1849 Spooner shipped an order with the note, "This lot of rope is the first and only parcel we ever marked in *diameter*. It comes rather awkwardly & seems odd, but we have no objection to the mode." In modern practice both diameter and circumference are used. At sea and generally on inland waterways, the larger ropes are designated

by circumference and the smaller by the number of threads; i.e., the number of yarns they contain.[4] For land usage, diameter is the general designation.

Plymouth Cordage is Born

Bourne Spooner remained a year or two in Plymouth before he could find backers. His brother-in-law John Russell, a local shipowner, was one of the first to be interested. Russell in turn interested his friend Caleb Loring who was the head of a Boston firm of importing merchants. Other early backers and organizers were John Dodd, William Lovering, Jr., David Low and Charles Nichols of Boston. All except Loring were young men between twenty-five and forty years of age and all were merchants; but they had no connection, social or otherwise, with the Boston mercantile and financial aristocracy. None was college educated. Few, even, were Boston born; they had emigrated to the Hub to seek their fortunes. David Low, of course, came from Salem where an old ditty goes:

Old Low, old Low's son;
Never saw so many Lows since the world begun!

Caleb Loring, sixty years old and the leader of the group, belonged to an old family of Hingham. He

[4] Thus, a 1¼-inch rope is called 15-thread because it is laid from three strands, each formed from five yarns.

was known as a very successful man; it used to be said, "If Caleb Loring started down Beacon Hill naked, he would have a brass-buttoned frock coat, striped trousers, a beaver hat and a gold-headed cane by the time he reached Long Wharf."

On 12 June 1824 Governor Eustis of Massachusetts signed a bill incorporating "Bourne Spooner, William Lovering Jr., John Dodd and John Russell . . . by the name of the Plymouth Cordage Company, for the purpose of manufacturing cordage." Probably the news did not even raise an eyebrow among the big merchants on State Street. Yet this small corporation with an initial capital of $20,000 has outlasted every concern whose bonds or shares were then listed on the Boston Stock Exchange.

The by-laws of the Plymouth Cordage Company, adopted at the first stockholders' meeting, included the adoption of the corporate seal, "a round brass plate with a figure of a ship in the centre, surrounded by a circle containing the name of the Corporation." That good ship *Plymouth*, always depicted full rigged and under sail, has since been seen in every seaport of the world, and in no small number of inland points as well.

Caleb Loring, who took thirty-eight of the $100 shares, was elected Treasurer at the second stockholders' meeting on 22 August 1824. At the same meeting his son Charles Greely Loring, a recent Harvard graduate who later became a famous lawyer, was chosen clerk. The first Board of Directors were Loring,

Spooner, Dodd, Lovering, and Low. All told, there were only ten stockholders. Spooner was appointed superintendent of the ropewalk under the title of Agent, and given full charge and responsibility for erecting and managing the works at Plymouth. His salary was $1100 per annum. Within a year the amount of capital stock was increased by $10,000, all but one of the old stockholders taking it up *pro rata*.

Bourne Spooner had already acquired the land and promptly conveyed it to the Company. He was a shrewd man, as his choice of site proved. Of the four or five small parcels that he purchased, the first had a 130-foot frontage on the harbor, at the terminus of one of the less intricate of the channels between the mud-flats, so that small vessels could come up to a wharf at high water. Another parcel a few rods away included a mill dam and what in New England is called a "mill privilege," an exclusive right to use the water power of Nathan's Brook in any feasible manner; a second "mill privilege" higher up the brook was also secured. There was just enough land for the ropewalk, together with a house lot on the main road from Plymouth to Boston where Spooner intended to make his home. Indeed, so well selected was this site that when the Old Colony Railroad was built from Boston to Plymouth in 1845, it had to pass so close to the cordage property that not even a spur track had to be built. Other parcels of land were added from time to time; but the total area

on which the plant and offices stand today is only forty-nine acres.

Except for the old grist mill, which served first as a workshop and later as the office, everything had to be built from the ground up. First, Spooner set men to work raising the dam and building the raceway for his water power; next, he started work on his own house and the ropewalk. The parts of the simple machinery, ordered from Halifax, were put together by local artisans who were paid from $1.25 to $2.50 a day, the larger sum being for a foreman. Boy helpers were paid $.75 a day.[5] It must have irked Spooner, an ardent temperance advocate, that he had to serve the construction gang a tot of rum at 11 A.M. and another at 4 P.M. Workers in the ropewalk never had that privilege!

As no housing was to be had near the site, and no transportation was available from Plymouth, the Company had to provide homes for its workmen. Early in 1825 Spooner signed a contract with Ebenezer Lobdell to build for $2400 a six-family house 29 by 108 feet, each tenement to have a living room, kitchen, pantry, two bedrooms and two fireplaces, a cellar to run under the whole; and each family to have a garden. The rent of each tenement was $40 a year until 1827, when it was raised to $52. Proper workmanship and

[5] All these sums in the early accounts are stated in the old-fashioned manner of shillings and pence, 6 New England shillings being reckoned to a dollar. Thus, 75¢ = 4*s* 6*d*; $1.25 = 7*s* 6*d*; $2.50 = 15*s*.

finish were insisted on by Spooner, but there was, of course, no plumbing. How unfavorably that innovation was still looked upon is indicated by the fact that in 1825 a contractor obtained permission to install flush toilets in the State House at Boston, only by filing bond for $5000 to remove them and re-establish privy vaults at any time within three years if the legislature so desired!

The principal building, of course, was the 1050-foot-long ropewalk. Lumber for it was shipped from Portland, Maine; and the total cost, including the underpinning, was around $10,500.

The directors began buying raw material even before Spooner was ready to work it into rope. Of the two kinds of fibre then available for ropemaking, Russian hemp was imported from the Baltic in sailing vessels, and American hemp came by water, down the river to New Orleans and thence by coasting vessel. The growth of hemp in America had long been encouraged by government bounties, premiums and even by making it legal tender for taxes; yet hemp was never produced on any great scale until after 1820, and then only in the upper Mississippi Valley. The hemp plant (*Cannabis sativa*), similar to flax, requires retting (softening by moisture to break out the fibres) and breaking and scutching (beating) to clean the fibres. Kentucky hemp was "dew retted" (spread on the grass for several nights) which gave it a dark gray color; Russian hemp, being water-retted by hand, had a light cream color, a little darker than manila. Russian hemp was

what seamen were used to and what they demanded; so the Plymouth Cordage Company for many years used Russian hemp exclusively.

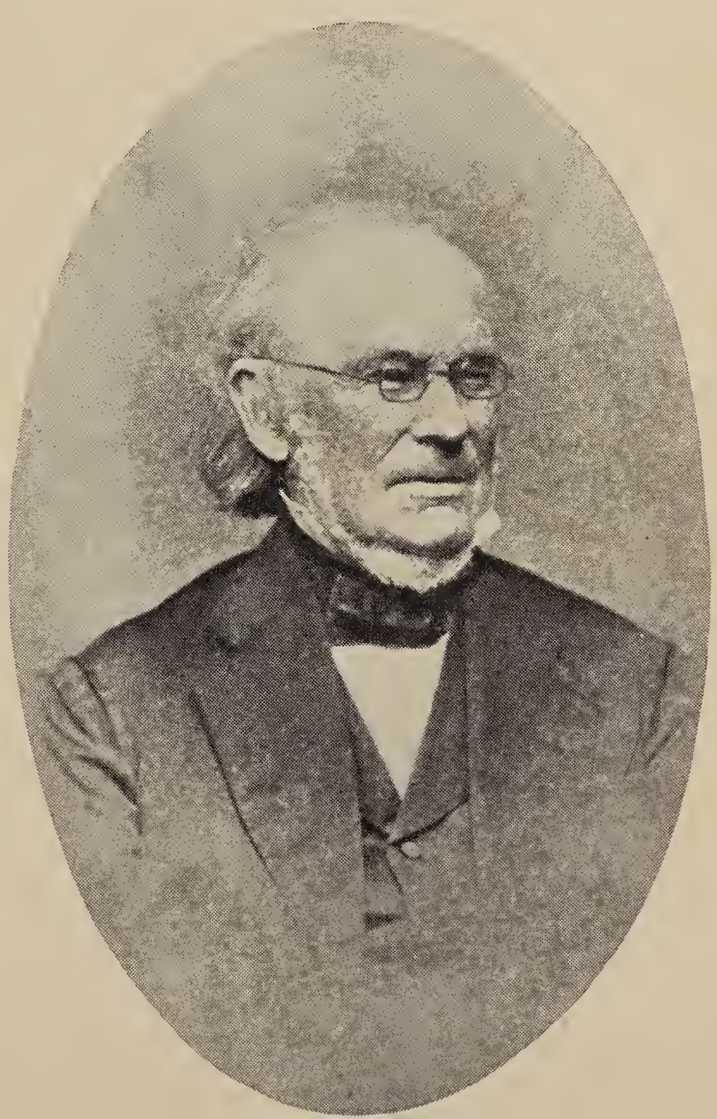
The Board of Directors on 1 November 1824 appointed a committee to purchase 50 tons of Russian hemp in the Boston market at $165 per ton on six months' credit. The purchase was made promptly, part of the amount being furnished by Caleb Loring who dealt in hemp as part of his mercantile business. This lot, with about 30 tons more procured at the same price or less, was most fortunate, since by November 1825 the price rose to $205 per ton. Early purchases at attractive rates helped the new factory to produce for a competitive market. Next, anticipating a constant need for moving hemp from Boston to Plymouth, and cordage from Plymouth to Boston, the Company purchased a five-eighths interest in the sloop *Hector* for $1000, agreeing with the owners of the other three eights that "the vessel shall always be at the command of the Corporation, and when not wanted for its use, shall be employed in the best manner for the mutual benefit of all concerned. This locally built sloop, a good sailer, made frequent runs between Boston and Plymouth carrying six, eight or ten tons per passage, together with such other freight and passengers as she was able to pick up. Between passages, or when the *Hector* was undergoing "upkeep," the Company employed the regular Plymouth packet sloops — *Polly*, *Eagle*, *Splendid*, *Atlanta* or *Thetis*.

First Sales and Machinery

By 1 March 1825 the stockholders were eager for production, and the Directors began to needle Spooner, who replied that he was ready to begin. In the Plymouth newspaper *Old Colony Memorial* for 12 March, appeared his first advertisement, here reproduced, soliciting orders and offering work; and only a week later he made the Company's first sale, 324 pounds of 4¼-inch and 4½-inch rope, for the brig *Massassoit*, owned by stockholder John Russell, for $32.40. Within a month Spooner had obtained his first large order for a "gang" of cordage from Joseph Holmes, an important shipbuilder of Kingston. In cordage parlance a gang means the complete equipment of a vessel's cordage — standing rigging, running rigging, cables; everything down to marline for seizing, wormline for filling the contlines between strands in order to make shrouds perfectly round, and spunyarn for chafing gear. This initial gang to equip a schooner amounted to 2149 pounds of rope at ten cents a pound, on six months' credit.[6] The *Black Warrior* of Duxbury was another early customer. On 18 April the *Harriet* carried a

[6] See Appendix A for gang of standing rigging ordered for a 1000-ton ship in 1862. It amounts to over two miles of rope in various sizes from 2- to 9¼-inch, and over a ton of smaller stuff. Moreover, this gang includes no boltrope, which at that time was supplied by the sailmakers, nor any manila running rigging. This is followed by a complete gang of standing and running rigging for a 400-ton brig. There are 1.3 miles of the standing and 2.5 miles of the running rigging.

Spinning yarn in the old ropewalk. John Moore, veteran spinner, using American hemp.



Bourne Spooner, Founder and first chief executive of the Plymouth Cordage Company, 1824–70.

PLYMOUTH CORDAGE.

HARVEY C. MACKAY, Selling Agent for the *Plymouth Cordage Company*, will contract to furnish vessels with Patent Cordage, manufactured from the best of hemp, hackled, laid up by water power, and warranted equal to any Cordage for sale in Boston.—For Gangs of Rigging, Whale Lines, Bolt Rope, Manilla Rope, &c. apply to said Agent, No. 12, Rowe's wharf.

june 6 is&ostt

PATENT AND COMMON-LAID

CORDAGE,

Manufactured by Water-Power.

THE *Plymouth Cordage Company* hereby give notice, that they have on hand *One Hundred Tons, Clean St. Petersburg Hemp*, of superior quality, which they are ready to manufacture into *Cordage* of any size or description to suit purchasers. Their *machinery* and *water privilege* is equal to any in the Country—and their *Cordage* shall in every respect be equal to their advantages. All orders for *Cordage*, in any quantities shall receive immediate attention, at the Ropewalks, from *BOURNE SPOONER.*

Plymouth, March 12, 1825. tf46

N. B. A number of good Spinners would find employment as above.

EARLY ADVERTISEMENTS. FROM *Old Colony Memorial* OF MARCH 12, 1825, AND BOSTON *Daily Commercial Gazette* OF FEBRUARY 20, 1835.

VIEW OF PLYMOUTH CORDAGE COMPANY FACTORIES ABOUT 1860. THIS LITHOGRAPH SHOWS THE BRICK MILL AND SLATE MILL AT THE RIGHT, AND OLD ROPEWALK AND TAR HOUSE, WITH CHIMNEY, IN CENTER.

return cargo of 6402 pounds of miscellaneous cordage and on 3 May another of 7629 pounds, to stockholders Low and Lovering at Boston, for sale to ship chandlers at the best price they could get. Sales were effected through a Boston merchant, Benjamin Rich and Sons, who charged 2½ per cent commission and promptly found the Company a good customer at Bath, Maine.

The first machinery used at the cordage plant was very simple, consisting of a few shafts and wheels that conveyed power to the ropewalk. Spinning machines for hemp fibre had already been invented, but were not considered feasible by Spooner. For the Plymouth Company, like most ropewalks of the time, was too small to make machinery pay. Spooner's first advertisement, as we have seen, offered to make plain or patent-laid rope. The latter simply meant that water power was applied to the forming and laying processes; spinning of the fibre into yarn was done by the traditional method. The spinner with a hank of fibre around his waist walked backward down the ropewalk, while a large spinning wheel turned by hand imparted the desired twist to the yarn.

Hours and Wages of Labor

By October 1825, when the ropewalk had been in production for six months, it was employing fifty hands. Most of the names had been familiar in the Old Colony

of Plymouth for two centuries: Doten, Osgood, Savery, Slocum, Wadsworth, Cobb and Holmes. The first boys, Elijah Weston, Thomas Carter, Rufus Adams and Henry Vogel, were engaged in 1826. They signed the traditional indentures by which the apprentice promised "said Master well and faithfully to serve, his secrets keep, his lawful Commands duly obey," and engaged themselves not to frequent alehouses or taverns, play cards or dice, contract matrimony or commit acts of vice and immorality. Apprentice boys were given room and board and $35 a year until they were twenty-one years old, when they could have a regular job in the factory. Some were boarded at a neighboring farmer's for $2 a week including washing and mending, at the expense of the Company. Apparently these lads did not view the ropemaking business with any great enthusiasm, as a number of them ran away and few entered the Company's employ after their terms were expired. One even persuaded his family to pay $50 to break the indenture. A town like Plymouth was full of opportunities in those days to go to sea; the more robust and adventurous boys shipped on a fisherman, coaster or foreign-bound vessel, or went whaling out of New Bedford. There were exceptions, however, John Smith, apprenticed to the Company in 1829, was present at the 75th anniversary celebration in 1899. John Donley, apprenticed in 1830 at the age of sixteen, remained in the Company's employ for sixty-six years and just missed the anniversary

by a few weeks. The apprentice system lasted little more than ten years.

The earliest wages paid at the ropewalk were 5 shillings (85¢) a day for common labor and 7 shillings ($1.16) a day for hand spinners. It was some time before these wages were raised, and apparently for a time they were lowered, since in 1836 there was a brief strike that was settled for 7 shillings a day. Eight shillings ($1.35) a day was the usual pay in the early eighteen-forties. These were the expected and usual wages at that time. It was Spooner's policy then, as that of the Company since, to pay going wages or a little better. What this pay amounted to in "real wages" we shall leave the economists to determine; but during the first ten years of the Company's existence it was possible for a family to rent a four-room tenement from the Company for $1 a week, buy pork for $.08 a pound, a barrel of flour for $6.25, butter for $.19 a pound, molasses for $.45 and New England rum for $.48 a gallon. Fuel could be cut for the mere labor of doing it in the nearby oak woods; fishing was free for anyone who could build or borrow a boat; the alewives ran up the brooks in the spring in such numbers that every family caught enough to salt, dry and pack in wood ashes; and a "kentle" of salt codfish, a barrel of salt halibut fins and napes, and a bin of potatoes went far toward carrying a large family through the winter. Excellent duck- and partridge-shooting could be had by anyone who owned a shot-

gun, and every family had room for a henhouse and vegetable garden. Under these conditions and with the then scale of prices, and in the absence of modern gadgets and entertainments that eat up income, $1.35 per day for six days a week was not to be despised.

The hours of work were from sun to sun, as in most New England factories, until a ten-hour law was passed around 1870. Such hours seemed reasonable to working people at that time because most of them, or their fathers, had been farmers and

The farmer works from sun to sun,
But woman's work is never done.

As in the first detailed work schedule that has been preserved, of 1852–53, the longest day was eleven and a half hours, and the shortest seven and three quarters hours, it may be inferred that hours were still longer a quarter-century earlier. Pay was the same for a short as for a long day.

Until after the Civil War, the only holidays except Sundays were Fast Days (the first Thursday in April), Fourth of July, Thanksgiving and Christmas. But the ropewalk was unheated and, when the thermometer fell below 10° Farenheit, work was canceled, not so much for comfort as that tarred yarns became too stiff to work at low temperatures. Days when the plant was closed were called "banyarn" days, an adaptation of the old naval term "banyan day," when the crew were put on short rations in order to catch up with some overexpenditure in their mess. Banyarn days

at Plymouth averaged about fifteen a year until the first heated building was completed in 1851; it was never practical to heat the ropewalk.

Early Difficulties

By August 1825, fourteen months after the Company had been chartered, it had sold about one third of its total production and had over 150,000 pounds of cordage left, 120,000 pounds of it still in the factory. Examining the early cost statistics, they break down to the following averages, in cents per pound:

COSTS		NET PRICE RECEIVED
Hemp	$ .0733	
Labor	.0200	
Tar, soap, freight, etc.	.0062	
Total cost	$ .0995	$ .0939

Plymouth was selling below cost in order to break into the market.

The cordage business required an exceptionally large amount of working capital, usually as much as the fixed investment, owing to the relatively high cost of raw material, the need to carry large inventories, and the custom of granting long credit on sales. Shortage of working capital was the immediate cause of the collapse of the great National Cordage Company in 1893, to which some authorities attribute the finan-

cial panic of that year. The Plymouth Directors learned this lesson early. In the summer of 1825 they increased the capitalization to $40,000 and issued $4000 more stock early in 1826, all of it to original stockholders. They were not called on for any new capital until the end of the century; but to tide the Company over the initial struggle for a market, it had to borrow money from stockholders in the form of personal notes. Spooner, Lovering and Nichols all gave notes for one or two thousand dollars in 1826, but Treasurer Loring was the most frequent lender; at one time the Company owed him $32,121.25. This meant that Loring was supplying most of the Company's working capital out of his own pocket. In recognition of this the Directors voted him a lien on the Company's property in order to provide "for changes or accident which might imperil his security." In addition, almost every stockholder spent much time, thought and energy on the Company's affairs without remuneration. Although there seems to have been complete confidence between Spooner, the practical manufacturer in Plymouth, and the mercantile directors in Boston, this dual management was inconvenient. It required an entire day for the thrice-a-week stagecoach to span the distance between the two towns, and a packet-sloop passage might take several days.

For the year ending 31 July 1826, total manufacture (not sales) was roughly 750,000 pounds. Considering

the unfinished state of the factory, this must have been moderately full production. It was as much or more than was manufactured in any year for several years to come.

As of 1 August 1826 the value of the Company's fixed assets was as follows, all sums representing actual cost:

Land	$ 1,692.52
Raceway and Dam	1,327.95
Ropewalk	9,464.27
Underpinning Walk	1,144.57
Machinery	8,663.78
Repairs of Machinery	76.90
Wharf	1,751.71
House and Barn	2,488.77
Workmen's houses	2,807.31
Store	551.77
Workshop	36.07
5/8 of sloop Hector	1,000.00
Total	$31,005.62

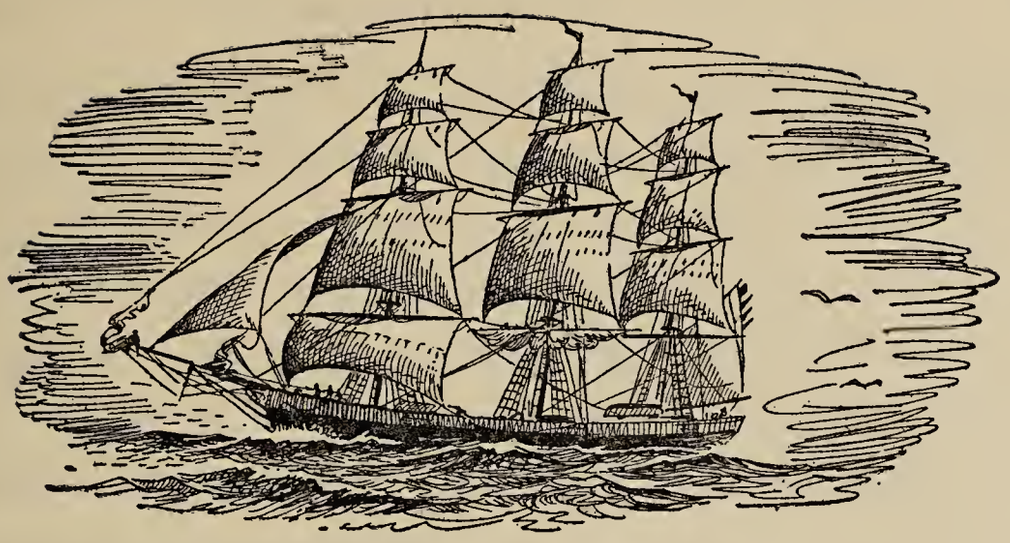
Current assets were as follows:

Cash on hand	$ 260.71
Cordage Stock	35,068.98
Store Stock	1,196.43
Accounts Receivable	14,070.16
Total	$50,596.28
	31,005.62
Total Assets	$81,601.90

Against this stood accounts and notes payable totaling $36,331.07. Adding to this the $44,000 capital

stock and a "suspense stock" item of $1,270.83 completes the balance.

It will be observed that the fixed assets had swallowed up almost three fourths of the proceeds of the capital stock, and there was no surplus. The $13,000 which remained was insufficient to finance stock, inventory and sales credit at the attempted level. Both stock and inventory figures were too high for a company of such modest capital and for the volume of business. It was time for a careful review of operations. More sales must be made, and quickly, if Plymouth Cordage were to survive.



II. TWO DEPRESSIONS AND A WAR, 1827–1865

Company Policy and Practice

"SINCE THE ESTABLISHMENT of our Rope Walk," wrote Caleb Loring on 10 July 1827, "from one-half to two-thirds . . . of the cordage manufactured has been sold to Gentlemen in Maine." Shipbuilding in the State of Maine was growing fast; the Company had an excellent agent at Bath, in the person of David C. Magoun; but there was plenty of competition from the nearer Boston and Salem ropewalks. So the Plymouth Company could not be content with the Maine market. As early as September 1826, it made its first sale of a gang of cordage to a New Bedford whaler; and within two years it was making a strong drive for a share of the whaling ship market of Southeastern Massachusetts, which New York ropewalks had hitherto considered their own. Isaac Howland of New Bedford, selected as the Company's agent in the big

whaling port,[1] pushed Plymouth Cordage so successfully that the whalers soon became the Company's most profitable customers. They were excellent customers, too, consuming much more cordage than the ordinary standing and running rigging. Besides replacements during their three years' Pacific voyages, they consumed many hundred fathom of whale warp (towline it was called in the trade); the line attached to the harpoon and paid out from tubs in the whaleboat. This vital line had to be made with unusual care of the very best hemp, since the kinking, snarling or parting of it might mean the loss of life, and certainly the loss of a whale. So, if a ropewalk could sell towline that could stand the wear and tear of whaling for as much as two years, whalemen became its fast friends and faithful customers. "I ever aim to supply the requirements of whaling agencies," wrote Spooner to the Macys in 1844, "in preference to the more uncertain agencies who sell mostly in new gangs."

At the same time, the Company reached out into other parts of New England. Agents were appointed at Gloucester, New London, Providence and Provincetown between 1829 and 1831. Most of these were ship chandlers who kept a stock on hand of all kinds of rope likely to be in demand, so that they could supply anything from an anchor warp to a complete gang

[1] Charles R. Tucker succeeded him in 1837 as the Company's New Bedford agent. Albert Sawin became agent for Fairhaven and Gideon Barstow agent for Mattapoisett, in 1831; I. and P. Macy and Gideon Gardiner became agents for Nantucket in 1828, and William Coffin agent for Edgartown in 1831.

at short notice, for a commission of 5 per cent on net sales. But in some of the smaller ports of Maine and Cape Cod, the agent was simply a retired shipmaster who kept no stock but solicited orders from his neighbors and took a 2½ per cent commission. In Boston the Company's products were handled by established ship chandlers until the eighteen-fifties, when an agent was appointed. All agents, whether ship chandlers or not, acted as jobbers for their respective communities and sold a few coils of rope for fishing boats and domestic uses to general stores and other retail outlets.

In 1830, as a trial, Spooner shipped a ton of cordage to an agent in New York with the promising name of Cabot, only to find that he could not compete with the local ropewalks in price, even if Plymouth paid the freight. As another experiment, Spooner in 1827 made up some baling rope out of hemp not good enough for ship cordage, and consigned it to Charleston, South Carolina, for use in baling cotton. But the baling rope market was not then taken seriously; it was something to turn to when business elsewhere was poor.

For several years Plymouth Cordage met its competitors in price, when it did not undersell them a fraction of a cent a pound. This was partly due to Spooner's efficient management of the ropewalk, partly to Loring's keenness at buying hemp. An old hand at that game, he had the feel of the market, stocked up when it was low and held out when it was

high. As a result, raw material cost Plymouth Cordage about ten per cent less than its competitors. He refused, however, to allow Spooner or any of the company's agents to make price-fixing agreements. "I have always considered," he wrote to Spooner in 1829, "that we could afford to sell for less than others; it is now my opinion that we ought to do so."

It was too much to expect that this happy state of affairs would last long. New Bedford was the scene of the first of many price wars. In 1829 agent Howland wrote that some dealers were selling gangs there for 11¼ cents a pound; in reply, Loring told him to cut Plymouth prices to 10 cents if necessary. Winslow, Lewis & Company of Boston entered the arena the same year, but Loring stoutly instructed agent Howland "to sell as low as Mr. Lewis, let him sell as he may, rather than lose a sale." When Spooner protested against selling below cost, Loring replied, "One thing is certain: cordage must be sold at some price to meet the demands against me for hemp." But the leading and guiding principle of the Company, one in which Spooner, directors and stockholders were in perfect agreement, was never to sacrifice quality, whether by adulteration of fibre, hasty workmanship or any other way.[2] Their conscious policy was to

[2] Spooner even shipped back to Boston a ton of hemp that was "overshot" — a trade term for second-rate — and had it sold at auction at a loss; he had the grim satisfaction that one of Plymouth's competitors bought it in and got stuck with it. He regarded with contempt a device of his less scrupulous competitors known as "pickling," which meant soaking the rope in brine so that after being dried the salt would attract moisture and increase the weight of the coil.

worm their way into this highly competitive business by establishing a reputation for quality, so that satisfied customers would return to Plymouth when they built new ships or rerigged old ones. Spooner frequently charged his agents, "Never lose a customer who would give us the preference at equal price." These policies certainly paid off, for they enabled the Company to weather the deepest business depression of the nineteenth century.

Enter Manila

For the years 1829 to 1837 there is little to record. The Plymouth Cordage Company was still a small affair, even in relation to the period. The capacity of the plant was 500 tons of cordage per annum, but it had never produced more than 400 tons. Seldom were more than fifty people employed, and often less. Hemp continued to be brought to Plymouth by sloop and cordage delivered by the same slow method. "Do your coasters never sail without a fair wind?" inquired Loring of Spooner in 1827. Of course not, coasters never did! And in severe winters the harbor froze, so that cordage if delivered at all had to be sent by pung or wagon. Most of the deliveries to New Bedford were by ox-drawn wagons, which made barely

three miles an hour but were faster than the sea voyage around Cape Cod.

The only innovation during these eight years was a new material. Abaca, the fibre generally called manila because grown in the Philippines, was first purchased by the Company in 1830.[3] The great advantage of manila over hemp was its cleanliness and durability. Rope made of it did not have to be tarred like hemp rope in order to resist the deterioration caused by rain, heat and salt water. The consequent cleanliness of manila rope, coupled with its durability and flexibility, made it the ideal line for running rigging; even to this day nothing better has been discovered.[4]

Plymouth took up manila with enthusiasm and by 1839 was using almost 1200 bales of it a year. Manila was found to be better for whaling warp or towline than tarred hemp. In a letter to a customer at this time, who inquired about comparative costs of tarred hemp and manila for running rigging, Spooner wrote that the latter cost about 18 per cent more than the former for the same length, but was more than worth the difference because it lasted on shipboard at least 25 per cent longer, was lighter and easier to handle, and put less weight aloft. Finally, this thrifty New

[3] Abaca was first imported in commercial quantities in 1820 at Salem, which had established trading relations with Manila.

[4] Nylon rope is better for main sheets, tenders' painters and anchor ropes of small craft because of its elasticity and durability; but as now (1949) made, it is too elastic for halyards and is much more expensive than manila. The matter of expense precludes a more general use of the excellent Italian hemp.

Englander added that wornout manila had a higher junk value than the tarred hemp — reminding one of the old lady who always chose a straw bonnet because, when outmoded, it "made a nice mouthful for the cow." Some conservative shipowners, especially the British, continued to demand tarred hemp for running rigging, but by the time of the Civil War nothing but manila was used on American vessels.

After all, what line is better than well-laid manila? It looks clean, smells nice, dries quickly, is easy on the hands, and after a few days' use becomes beautifully flexible, coiling neatly without kinks or figure-eights. It is dependable, too. My barkentine *Capitana*, rigged by Plymouth, sailed across the Atlantic and back and through the West Indies in all kinds of weather, for a year, without parting a strand or having to replace a single line. Of course she was rigged properly, so that the lines did not chafe, and we took care to "freshen the nip" on the blocks every day in the trades. Nevertheless, we considered the Plymouth performance outstanding.

Henequen from Yucatan, commonly though inaccurately called Sisal because originally shipped from that port,[5] reached the United States at about the same time as manila and was used by some of Plymouth's competitors to adulterate manila; but Spooner would have none of it. "I never bought a pound of Sisal Hemp — of course we don't make rope of it," he wrote

[5] Henequen is *Agave fourcroydes;* true sisal is *Agave sisalana.*

in 1846. "The use of that article for manufacture seems to belong almost exclusively to New York." In 1855, when sales were slack and competition exceptionally keen, he put out a "Composition White Rope" that was partly sisal; but it was honestly labeled, and shortly dropped. Henequen and sisal are perfectly respectable fibres, best for binder twine and many other uses; but sailors of World War II know to their cost how inferior they are to manila as a constituent of rope.

Mechanical Improvements

Caleb Loring, after ten years' service as Treasurer of the Company, resigned in 1834 and was succeeded by James Harris, a director since 1831. This did not mean any severance of the Loring family from the Company — far from it! The clerkship of the Board of Directors was filled by four Lorings in succession [6] for 53 years; three Lorings, grandfather, father and son, have been presidents of the Company between 1890 and 1942; one is still chairman of the Board of Directors. Caleb Loring continued to be one of the largest stockholders until his death in 1850, and was frequently consulted on Company affairs, even at times taking part in directors' meetings.

In 1837 a logical change was made by combining

[6] Charles G. and Francis C., sons of Caleb Loring, and Caleb William, son of Charles G., until 1884; Augustus P. to 1897.

the offices of Agent, which meant the manager resident at the plant, with that of Treasurer of the Company, in the person of Bourne Spooner. As such he continued until his retirement in 1870, after serving the Company forty-six years; and he was succeeded by his son Charles W. Spooner for twelve years. The Treasurer was virtually President of the Company until that office was created in 1867.

On 1 April 1837, when Bourne Spooner added the Treasurer's duties to those of managing the plant, a prolonged and serious economic depression was just beginning. Fortunately the Company had already decided to introduce new machinery. Hitherto, Plymouth Cordage had spun hand-hackled hemp on hand-powered spinning wheels and used water power only for forming strands and laying rope. Spooner was no pioneer in mechanization; he liked the old ways best and preferred to let rivals experiment. But he had to fall in with his age. The introduction of Daniel Treadwell's spinning jenny for rope-yarn, in the Charlestown Navy Yard, and of the Goulding machines for spinning, tarring and laying at the Winslow, Lewis & Company ropewalk in Boston, both in 1836, seem to have needled Spooner into action. After various abortive negotiations, he made a deal with Moses Day and Benjamin Sewall, proprietors of a ropewalk in Roxbury, to share with them exclusive New England rights to use spinning machinery invented by Day. Sewall & Day supplied as many machines as were wanted

for $60 down, plus a royalty of $3 a ton for all cordage manufactured by aid of them, Plymouth guaranteeing a minimum payment of $1000 per annum.

In order to accommodate the new spinning machinery, a new building was constructed by Plymouth Cordage during the summer of 1838. The "Hemp Factory," as it was called, was built of brick on stone sills, measuring 34 by 92 feet and three stories high,[7] not including an adjacent boiler house. Power furnished by Nathan's Brook was inadequate to turn the spindles; so, as no other water power was available, Plymouth Cordage did what it fervently hoped the American merchant marine would take a long time to do; it "went steam." An upright steam engine of about seven horsepower was purchased in Boston for $900 and coal was imported from Sydney, Cape Breton Island. The Day spinning machines, six for fine yarn and twelve for coarse (but all for manila), were installed that fall, and the Age of Steam began at North Plymouth on 3 December 1838 when this machinery was first put in motion.

That day marked another revolution, the entrance of women to Plymouth Cordage. "Two females from Mr. Day's factory" were imported to teach the other operators machine spinning. One of these "females," sad to relate, had to be discharged for "disorderly conduct," and took the other with her; but there was no

[7] It is the building behind the mill pond, at the right of the illustration showing the works in 1860. It burned down in 1866. The present (1949) No. 1 mill covers the site.

counterrevolution. Local girls, uncontaminated by the metropolis of Boston, were engaged; and women have been working in the Plymouth Cordage plant ever since, although always in a minority, since rope-making is largely a man's job.

The Day spinning machines were not much more productive than the hand ones; the main differences were that steam-power instead of boy-power turned the spindles, and the operator was able to sit by his machine instead of walking backward through the ropewalk as the yarn was spun. Machine spinning, however, required less effort and skill than the hand and walk method, and the saving in space was very great. The "Hemp Factory" could be heated in winter, which the ropewalk could not, and "banyarn days" disappeared, as far as the spinning process was concerned. For these reasons, and probably others too, the spinning machines proved so successful with manila that Spooner kept right after Day to construct others for spinning Russian hemp; and by the summer of 1839 Day had produced them. At the same time the 7-horsepower engine was replaced by a 20-horsepower giant, and the old water wheel by a new and larger one.

As early as 1841 Moses Day supplied Plymouth Cordage with twelve new and improved spinning machines which eliminated hand feeding of the fibre. Instead of a girl sitting by each machine, feeding hackled hemp fibre to the spindle from a roll of it

around her waist, chain gills carried a sliver of fibres to the flyer.[8] This "new principle," as Day called it, was more revolutionary than the machines of 1838; it was the beginning of modern cordage preparation and spinning by which a continuous, machine-prepared sliver is fed to the spindle without human aid. The change was effected without discharging workmen, because the industry was expanding rapidly and Spooner wanted increased production. He was so pleased with the new machines that he ordered twelve more for manila in 1841. Owing to their novelty, the "new principle" machines gave considerable trouble at first, but Spooner and his foreman were assiduous in remedying all defects, while Moses Day hung on them for advice and adopted their suggestions.

As soon as he had obtained the mechanical hemp spinners, Spooner turned his attention to improved tarring. All yarns made of Russian or American hemp fibre had to be tarred, for protection against weather and salt water. Hitherto, the tar had been heated in big iron kettles. The yarn was wound into big balls called junks, soaked for a while in the hot tar, passed through a roller to squeeze out the excess tar, rewound, and stacked to season. For the moderate sum of $700, Seth Wilmarth, the machinist employed by Day, built a "tarring system." This was simply a 25-foot copper trough, 18 inches square, in which the balls of yarn were placed while hot tar poured around them. The

[8] A "sliver" in ropemaking parlance is a roving formed of fibres laid parallel before being spun into yarn.

barrels in which the tar came from North Carolina were broken up to use as fuel for heating the tar, and a simple communication system was devised to keep the trough temperature right. When the foreman in charge found the tar getting cool, he stamped the floor once for every barrel stave to be fed into the fire, and the boys below complied.

After the tarred yarn, rewound on bobbins, had been seasoned sufficiently, it was taken by horse and cart to the ropewalk about 100 feet away. There the yarn was formed into strands and then laid into rope. The available water power was sufficient for these operations for many years.

This "tarring system" as Spooner called it, was far from perfect. One angry customer complained that he could scrape tar from Plymouth standing rigging with his fingernails. But what really worried Spooner was the fact that his Boston competitors, the Mill Dam Company, were turning out a tarred hemp rope of an attractive light yellow color, in contrast to his dingy gray or black. He asked Dr. Nathan C. Keep, an eminent Boston dentist and scientist and a stockholder of the Company, to analyze tars for him. Apparently the solution did not lie in the tar, but in the method of heating it, as a rival Plymouth ropewalk, the Robbins Cordage Company, found out. Spooner, following suit in 1843, did away with his boy-and-barrel-stave heating system and produced the desired color by laying steam pipe in the tarring trough.

The First Depression

These mechanical improvements were all effected in the midst of the great depression which, beginning with the panic of 1837, lasted with some fluctuations through 1843. For six years business was poor, prices low, and money "tighter than the skin on a cat's back." The credit situation worried the Plymouth Cordage Company even more than did the decrease in sales, for rope-making operated on credit. Hemp was purchased at six months' credit; sales were made giving from six to twelve months' credit from the date of delivery; and to meet its obligations for raw materials, new machines and new construction, the Company discounted these notes at the Plymouth Bank or drew upon its agents for their balances. When customers were unable to pay and banks refused to accept commercial paper, the system froze and the Company found itself in difficulties.

"You can hardly conceive of our embarrassment in these times," wrote Spooner to one of the agents in 1839; "having been obliged this month to meet our own debts of more than $8,000, and about the same amount of dishonoured paper." Spooner had to appeal to his fellow directors for help, and fortunately they responded, with one notable exception. That

gentleman, the first of the "merchant princes" of Boston to be elected to the Board, could better afford to make a short-time loan than any of his directors; but he refused.[9] Fortunately, credit conditions eased by the turn of the year, and in 1841 business was good again; but cutthroat competition had forced prices down to a level which yielded slight if any profit, and the worst was yet to come.

The depression in itself sharpened competition, but the progressive mechanization of the cordage industry intensified it. In earlier business recessions a ropemaker could lay off hands and even close his walk with no great loss; but now that thousands of dollars were invested in machinery, there was an incentive to keep going in the hope that cheaper production would counterbalance low prices. In this struggle for survival the weaker companies succumbed. During the twenty years from 1840 to 1860, which spanned two depressions, the number of ropemaking establishments in the United States declined from 51 to 30, while the value of the output doubled, from a little more than one million dollars to over two million. Plymouth had no essential or initial advantage in this contest, for it had to pay $1.25 a ton freight each way to Boston, and $3 a ton royalty to Day on his machines, items which amounted to about a quarter of a cent per pound in the Boston market.

[9] That refusal was typical. The Plymouth Cordage Company, no more than Henry Ford, obtained support from the titans of the American financial world.

Spooner did not share Loring's repugnance to price agreements. After becoming Treasurer he made deals with his local rival, the Robbins Company, whose output was about the same as Plymouth's. The Robbins agents did not always play ball, as Spooner bitterly complained in 1842; but the Robbins ropewalk burned down next year, and Spooner had the grim satisfaction of filling orders for his rival during reconstruction. Mr. Robbins eventually retired from business and his ropewalk found no purchaser.

The most serious competitor and price-cutter was Horace Gray & Co. of Boston, generally known as the Mill Dam Company. Horace Gray had better machinery than Spooner, and started selling at 11 cents a pound in 1837 when Plymouth was seeking orders at 12 cents. The agents of the two companies at New Bedford agreed to maintain prices, but the Mill Dam agent in 1839 was found to be selling their tarred cordage for 11 cents when the cost of raw hemp was 9½ and the cost of manufacture added 2 cents to that. Bourne Spooner, in accordance with his principle of meeting anyone's price for comparable quality, had to follow suit. Later in the same year he agreed with Robbins, an equal sufferer, that to avert disaster they would let Mill Dam take all New Bedford sales under 11 cents for tarred and 10½ cents for manila. That brought Gray into line; and the three firms, together with another Boston ropewalk, made a price-fixing agreement for the New Bedford market in February 1841.

This seems to have worked all right until the following year, when very serious competition arose in the shape of a new cordage factory in New Bedford itself, started by three young men of wealth and backed by the first families of that whaling port. In its initial year of operation the New Bedford Company produced 650 tons of cordage as compared with Plymouth's 482 tons; and it knocked prices down to 9½ cents a pound for tarred and 8½ cents for manila. "We have nothing to sport with," wrote Spooner to his Mattapoisett agent, "but I am unwilling to lose a customer, and should be glad to supply cordage to all who would give me a preference at *their* prices."

Price-cutting to that extent was ruinous, at a time when business was declining. Could any competitor to New Bedford survive in that market under such conditions? One after the other they pulled out — even the Mill Dam Company found the pressure too great and retired from the fray — but Plymouth stayed in hitting, because the whaling market was too valuable to surrender. That showed good judgment as well as stout heart, for in the spring of 1844 Plymouth's New Bedford agent managed to effect an agreement between the local firm and the few survivors, to maintain profitable prices.

The year 1843 was the "black year" in the cordage, as in many other industries. By March the price of manila line had fallen to 8¾ cents in Boston and by June one of Plymouth's Boston agents complained that rope could be bought there retail for 8½ cents. In

order to make a small sale in New York, Spooner had to accept that price, and pay the freight too. What made matters worse was the failure of several Plymouth agents. In the spring of 1843 its Nantucket agent failed, for 20 cents on the dollar. Next to go was the agent at Mattapoisett, owing the Company some $1680 of which only half was paid. The Provincetown man went next. When the stockholders held their annual meeting in September, Bourne Spooner informed them that the past year had been "the most disastrous in history." In order to sustain the Company's several agencies, it had to keep with each one a large stock, the whole amounting to $68,000 on 31 July 1842; yet the Company's entire sales for the subsequent twelve months amounted to only $80,000. To David Magoun of Bath, who proposed to set up in the cordage business in Maine, Spooner replied bitterly that he had much better purchase Plymouth Cordage stock, then much below par; to his old friend Caleb Loring he wrote of his "perplexity and trial." But, concluded this stout-hearted Yankee of fifty-three years, "our integrity is pretty sound yet." "We now have as much work as we can accomplish," and "the future bids fair."

Every effort was made in that black year to extend sales beyond New England, even on consignment — a method repudiated in normal times. To Braddock Loring of New Orleans, a former shipmaster and distant cousin of Caleb's, Spooner wrote inquiring about the kind of cables used by steamboats on the Mississippi. Soon he began shipping the required sizes. To

a firm in Charleston he offered boltrope and baling rope. To a gentleman of Belfast, Maine, he offered tarred manila for tying up clapboards and laths, at 10 cents a pound. Charles Howland of Buffalo was probably astonished to receive "a few coils of lightly tarred rope . . . the most economical for using on the Lakes"; and a firm in Darien, Georgia, received on commission a quantity of baling rope supposed to be "of right size and quality for your vicinity"; but if it was not, please let Plymouth know what they could sell to Georgia cotton planters.

Spooner also began experimenting with American hemp, which at that time sold 1½ to 2 cents a pound cheaper than Russian hemp. A special rope was made of it for forming log rafts on rivers like the Penobscot. Other cheap lines for domestic uses, like clothesline, plowline and bed cording, were made of American hemp and supplied to retail outlets. The first two are still in the Plymouth catalogue; but bed cords have disappeared along with twine for sailors' hammocks.

The Clipper Ship Era

The Treasurer's prediction of September 1843 was sound; the worst was over. Business picked up in the spring of 1844, although competition was still sharp and prices went down still further before they recov-

ered.[10] Whaling revived so quickly that Plymouth had to put off other customers for the sake of satisfying the whalemen. There were brief recessions in the summer of 1850, late in 1854 and early in 1855; but in general prosperity ruled up to the panic of 1857.

For this was the clipper ship era, glorious culmination of the age of sail. The discovery of gold in California created a demand for more, bigger and faster sailing ships, and a boom in Australia came just as the California trade settled down to normal. Britain and other countries had repealed or modified their navigation laws so that American vessels could compete on equal terms in practically every world trade route. The master builders of New York, Boston, Connecticut and Maine vied with each other in designing and constructing the fastest and best clippers. *Flying Cloud* and *Andrew Jackson* together made three 89-day passages New York to California; *Northern Light* returned from San Francisco to Boston in 76 days: *James Baines* made Liverpool in twelve days and six hours from Boston Light, and later established the

[10] Prices obtained by Plymouth Cordage Co., 1843–48, for cordage made from different fibres, in cents per pound:

	MANILA	AMERICAN HEMP	RUSSIAN HEMP
1843	9 to 8¼	(none made)	10½ to 9¼
1844	9¼ to 8¾	8½ to 7½	9¾ to 9
1845	9 to 8¾	7½	9½ to 9
1846	9½ to 8¾	7½ to 6¾	10½ to 9½
1847	9½ to 15½	7½ to 10	10½ to 11½
1848	11½ to 12½	9½	11½ to 12

world's record round voyage from London to Australia; *Lightning* averaged 15½ knots' speed for ten consecutive days and set up the all-time record for a day's run under sail, 436 miles. Even the competing packet lines to England and France put on "saucy, wild clippers" like *Dreadnought*, that could be counted on to make better transatlantic passages eastward than the steamships. Where 1000 tons had been a big ship before 1850, now vessels were built of 1500, 2500, even to 4556 tons in the fabulous *Great Republic*. Such vessels required miles and miles of cordage for standing and running rigging; and the clipper commanders' practice of cracking on sail to make records meant that rope was quickly worn out. For a few brief years these noble ships, the fairest thing the hand of man has produced in America, flashed their glory around the world; and everyone prospered who contributed to their building, equipment or operation.[11]

Clipper ships were also useful to the Company in providing swift transportation for manila fibre. In 1855 it received manila from the Philippines by *Winged Arrow*, *Southern Cross* and *Young America*. As early as 1845, with his new machines, Spooner was unable to accept more than two thirds of the orders he would like to have filled. In 1847 he installed a

[11] It is unfortunately impossible to tell from the Plymouth Company records which clipper ships were rigged with its cordage, because of the practice of selling through agents. From one of Spooner's letters, however, it is certain that Plymouth supplied manila boltrope for the sails of the *Great Republic*. One can merely infer from the large sales to Boston agents in the clipper ship era that many of the Boston-built clippers must have been rigged by Plymouth.

new steam engine to overcome the bottleneck of laying strands into rope, and that increased capacity fifty per cent. A new building, the "Slate Mill," was added to the Plymouth plant in 1850–51, with thirty-four new spinning machines and another new steam engine. What Spooner called "long-yarn customers," the agents who were slow to settle accounts, were sloughed off. It became difficult to get imported hemp; as early as 1845 Plymouth was making six gangs of American to one of Russian. In that same year the Old Colony Railroad built down to Plymouth, enabling the Company to by-pass the coasting vessels and make quick deliveries in carload lots. Eight years later the Company was importing manila directly from the Philippines, to meet a greatly increased demand for running rigging. The business of the Company doubled in the four years 1849–52. Spooner, as we have seen, was a manila enthusiast. He urged its use for towlines in place of tarred hemp rope, because of its greater resiliency; and it was he who introduced manila boltrope for edging sails. He was particularly proud of having supplied manila boltrope for the many and enormous sails of the clipper that ended all clippers, Donald Mackay's *Great Republic*.[12]

The only disturbance in the clipper ship era, other than brief recessions, was over selling methods. Other cordage companies believed that the five per cent com-

[12] Some idea of *Great Republic's* sail plan may be gained from the fact that the boltropes of her topsails were 8½-inch, and her main yard was 120 feet long.

mission allowed to agents was too much under new conditions of imperious demand and big orders for huge vessels. They proposed selling directly to shipowners, allowing them a five per cent discount in lieu of agent's commission. This was very well for Boston and New York firms in the shipbuilding centers; but the Plymouth Company, in a harbor which was fast becoming a backwater of world trade, depended on agents to make sales. Nevertheless it had to fall in line, and also to join an agreement to sell either direct or to regular dealers and chandlers. That cut out the commission business in the smaller ports. Some of the retired sea captains and others who had been making modest sales for years, qualified as "dealers" by laying in a small stock; others had to be dropped. To meet conditions at the Hub, Plymouth appointed the strong firm of Blanchard, Sherman & Company their sole agent for that area in 1851, thus securing a share of the clipper ship business.

Expansion continued. A firm of Norfolk, Virginia, undertook to sell Plymouth-laid seine rope to the Chesapeake Bay fishermen, but did not do very well. Three dealers in Louisville, Kentucky, and one in New Orleans handled Plymouth cordage and baling rope. In 1853 the Company began to import manila fibre directly from the Philippines and, in anticipation of a Russo-Turkish war, made heavy purchases both of Russian hemp and of American hemp. In the spring of 1855 the directors voted a stock dividend of $50,000

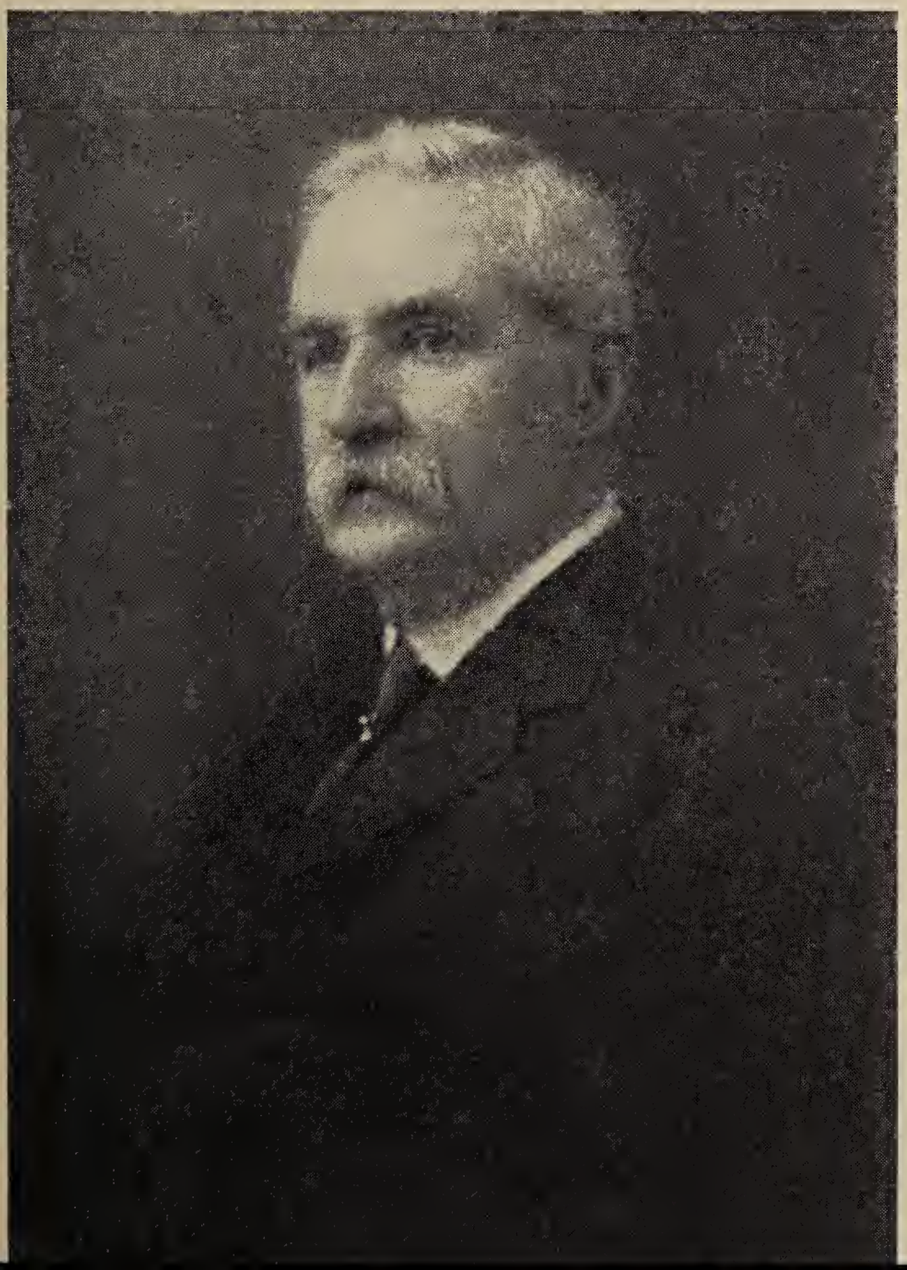
and gave Spooner a modest bonus of $800. And in 1856, when their Boston agent put in an immediate order for a gang of cordage amounting to 70 tons, Spooner was able to fill it in two weeks — a contrast to twelve years earlier, when the factory's total capacity was 50 tons a month.

By the summer of 1856 credit was tightening, and the country was slipping into another depression. Plymouth's best manila rigging, which had increased from the low prices of the "hungry forties" to 18½ cents in 1854, fell to 10 cents by the latter part of 1857 and 7½ cents, the lowest ever known, in 1861.

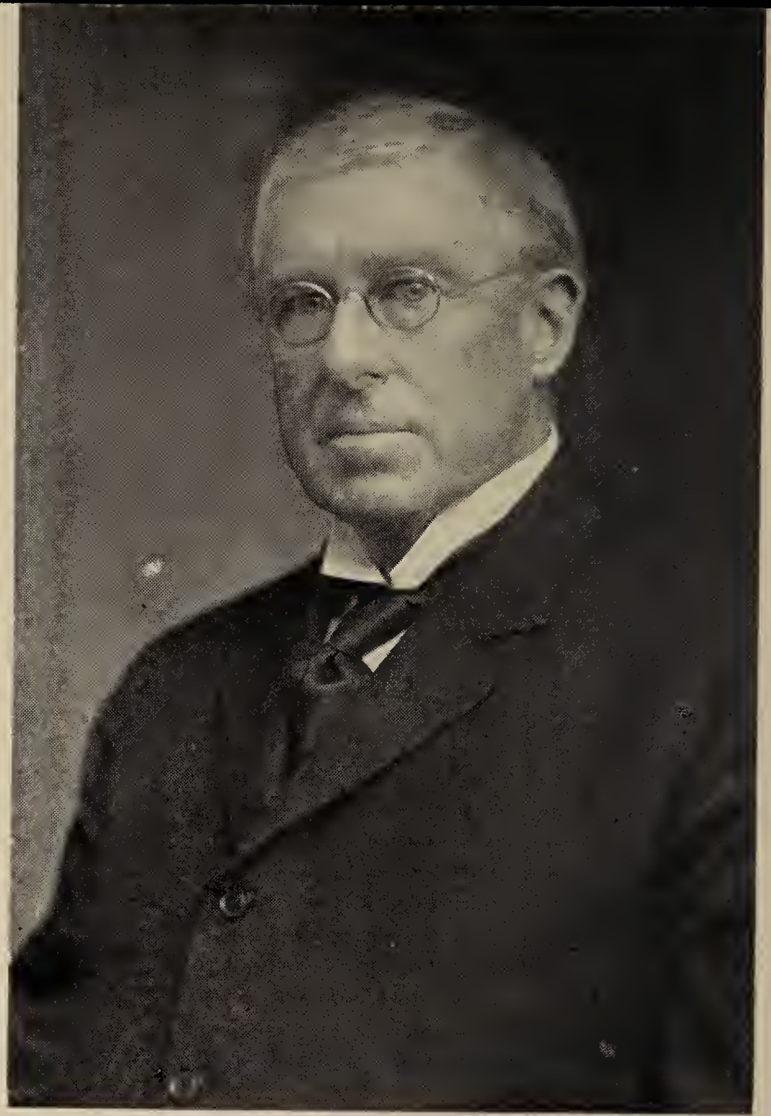
Railroad and Telegraph

The clipper ship era was also one of rapid railroad expansion in the United States. The dependence of Plymouth Cordage on sea transport, with its vagaries of wind, tide and weather (not to speak of the whims of packet-sloop skippers), was much lessened by the coming of the Old Colony Railroad to Plymouth in 1845. After the lapse of a century, the Old Colony has seen its passenger business dwindle as the use of motorcars increased, but in the nineteenth century it was one of the most profitable short roads in the country, famous for efficient passenger and freight service, brass-railed "dude trains" to Cape Cod summer re-

Group of Plymouth Cordage Company employees, about 1882. The men are standing on tar barrels and on a pile of coal for the power house.



Gideon F. Holmes, 1882–1911.



Augustus Peabody Loring, President 1897–1936, who was behind the numerous welfare activities at Plymouth.

Plymouth Cordage kindergarten class, about 1912, one of the many activities for employees and their families.

sorts, and dandy conductors with flowing whiskers. Plymouth Cordage from the first was one of Old Colony's most profitable customers. The railroad shortened the trip to Boston from all day to two hours. No longer did large stocks of rope and twine have to be accumulated in the hands of Boston dealers, lest a sale be lost through delay in delivery; and the Old Colony was so accommodating as to allow shipments to be left in its old Kneeland Street depot until called for by the customer. Beginning in 1847, shipments from Plymouth to the whaling ports were made by freight train, the cars being switched at South Braintree.

The railroad ran between the ropewalk and the sea, within 150 feet of the plant, so that no spur track was necessary for some time. Trains simply halted at Seaside, as the Cordage station was called, to take on or deliver freight. This system was inconvenient, as it sometimes took as much as 25 minutes to load freight cars with rope, and even longer to unload bales of fibre; and Old Colony engineers, independent as the sloop skippers, sometimes omitted this "whistle stop" if they had to make up time. So a siding was built in 1853, with a loading platform at the plant.

In those days, before the Interstate Commerce Commission was even thought of, Plymouth Cordage was in a good position to obtain favorable freight rates, as it could always ship by sea if it chose. In 1853, after considerable dickering between Bourne Spooner and Francis B. Crowninshield, President of the Old Colony

and himself a good Yankee trader, the railroad agreed to ship manila from Boston to North Plymouth for 12½ cents a bale,[13] as against 10 cents for water transportation; American baled hemp at $1.12½ per short ton (2000 lbs.) as against $1 per long ton (2240 lbs.) by water; and to move cordage from the plant to Boston at the same figure. These rates were so attractive that, in accepting them, Spooner readily promised to give the railroad all his traffic to and from Boston.

Tar continued to be brought up from North Carolina by schooner, direct to the Cordage dock. Shipments of fibre or cordage to and from New York might come by schooner around Cape Cod, or by Sound steamer to Fall River, thence to North Plymouth by Old Colony Railroad.

American hemp purchased at the leading market of that fibre in St. Louis was sent down-river by steamboat to New Orleans, where it was transshipped to a Boston-bound vessel and forwarded by rail to Plymouth. The New Orleans ships were probably too big for the channel to the Cordage dock. This long and slow route, often requiring three months or more, was so much cheaper than the early railroads with their different gauges and numerous gaps, that it was used well into the eighteen-fifties. In 1854 Douglass & Beer, Plymouth's buying agents at St. Louis, tried an all-rail shipment to Plymouth at a rate of $30 per ton.

[13] This rate was quoted in the old colonial manner, as ninepence. Manila fibre ran 8 bales to a ton.

That was less than Plymouth Cordage was then paying by the all-water route, but the results were not very encouraging. Two months after the hemp was placed in the cars at St. Louis, Spooner wrote to Douglass & Beer, "The Hemp you bought for us is arriving in dribles and appears to have been taken to Baltimore at haphazard." He persisted, however, and in 1855 the New Orleans route was largely abandoned in favor of rail.

It was much the same with shipments to Louisville, Kentucky, an important outlet for cordage. The river and sea route and the Great Lakes and canal route were tried; but the railroad won in 1852 when Spooner was offered a special rate of 72 cents per hundred pounds to the nearby river port of Cincinnati, via the roundabout "differential" route of the Rutland Railroad.

At the same time, the telegraph began to be used for purchasing fibre. "I well remember," recalled Gideon Holmes at the 1899 anniversary, "during my early connection with the Company, conversations in the office about like this: Mr. Spooner would say to Mr. Bartlett, 'Uncle Amasa, what do you think of manila hemp?' And after a discussion of some minutes he would say to Mr. Damon, 'What do *you* think of it?' Then after further discussion he would step to the window to see what the prospects were of its being fair weather on the morrow, and remark, if it should be pleasant he thought he would take the nine o'clock

train to Boston, and see what he could get five hundred bales for." That conversation cannot have been earlier than 1859, when Holmes became office boy; but as early as 1852 Spooner was using the telegraph from Boston to New York, St. Louis and Louisville. Probably the telegraph wires had not yet reached Plymouth in 1859; but they certainly had by the time of the Civil War. The office had to wait until 1891 to get on a long-distance telephone line.

Labor Changes and Schedules

Before the clipper ship era the Company had never employed more than 75 people at any one time. By 1859, after weathering another depression, the force was 118 strong; and in 1860, 140. For the most part, these were still of old Yankee stock, from Plymouth County or other parts of New England. Very few members of the "Irish invasion" of New England that reached its height after the famine of 1848, came to Plymouth. One of the first, if not the very first, was John Donley, an apprentice in 1830 at the age of sixteen who won a $2 prize for the best spinner as early as 1831, and remained in the Company's employ for sixty-six years.

Owing probably to the friendly relations between

Plymouth Cordage and Sewall & Day of Roxbury, where the principal German colony of New England was located, Spooner began obtaining a few German workmen in 1838. There is an amusing story in connection with the first family so obtained. Spooner made arrangements to have it brought to Plymouth in the packet sloop *Hector*, of which the Company owned a five-eighths interest. But the skipper of the *Hector*, a local man, declaring he would have no part in bringing foreigners to Plymouth, refused to receive them on board. Spooner at great "trouble and expense" had to find other means of transportation. In consequence of this incident, as he wrote to the skipper, "I find myself under the unpleasant necessity of notifying you that I shall, as soon as convenience may offer, appoint a successor to command the sloop *Hector*."

In the eighteen-fifties American labor was making one of its several spasmodic drives for a legal ten-hour day to replace the usual sun-to-sun or twelve-hour schedules. President Jackson had established the ten-hour day in the Navy Yards as early as 1836, but the movement had made little progress and bills to that effect in the Massachusetts legislature were always defeated. In 1853 the Plymouth employees, after a series of meetings, requested Bourne Spooner to establish a ten-hour day, winter and summer, in the plant. He replied that he had no objection, provided his five principal rivals did the same. They did noth-

ing, and that was that; but Spooner agreed with the workers' committee on the following schedule, which was evidently an improvement, from their point of view:

21 March — 20 April, start work 10 minutes before sunrise, breakfast hour 7.30–8.15, dinner hour 1–2, knock off at 6 P.M.

20 April — 20 August, start work at 5 A.M., *breakfast hour 7–7.45, dinner 1–2, knock off at 6.*

20 August — 21 September, same as 21 March — 20 April.

21 September — 21 March, breakfast before going to work, start (presumably) at sunrise, dinner hour 12 noon to 12.50, knock off at 8 minutes past sunset.

This works out at 11½ hours for the longest day and 7¾ hours for the shortest. The ten-hour day was not established until 1875.

No record of pay scales in the eighteen-fifties seems to have survived. But conditions and amount of pay must have been fairly satisfactory, by the test of a small labor turnover, and many opportunities for rising, when the company was expanding. Gideon F. Holmes, son of a local farmer who was occasionally employed in the ropewalk, entered the Company's service as an office boy in 1859 at the age of fifteen, for $3 a week; rose to invoice clerk and accountant in 1867 at a salary of $1400; became acting manager in 1875 and actual manager and Treasurer of the Company in 1882, at a salary of $4000. In 1909, when his fiftieth anniversary of service was celebrated, there were present his first boss, Richard McLean, and seven

other old gentlemen, all of whom had been in the Company's employ when Holmes entered it.

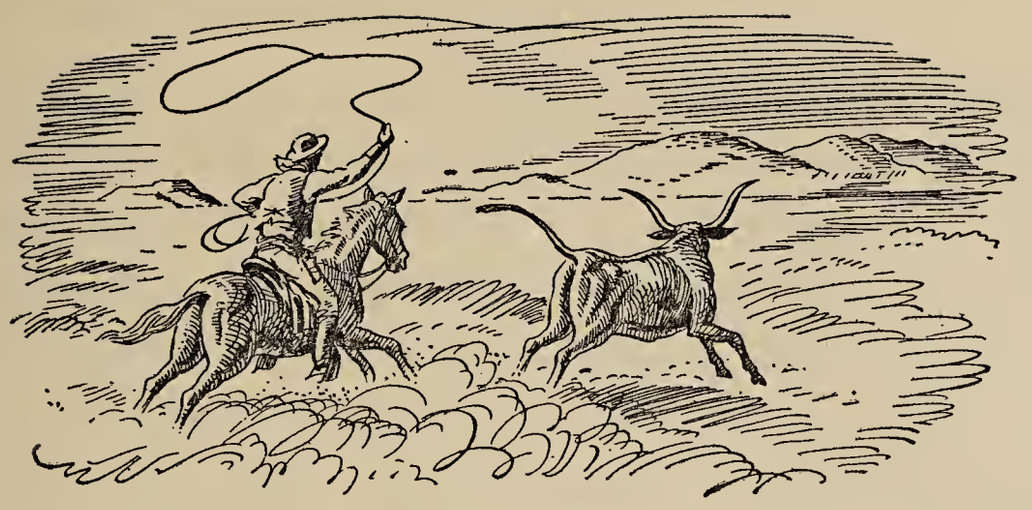
The Civil War

The panic of 1857 was short-lived, in comparison with the depression of 1837–43, but it forced the Company to go through the year without paying a dividend — a rare occurrence in its history. Just before the outbreak of the Civil War, prices had been so drastically cut by competition that a meeting of representatives of all the leading ropewalks in the eastern states was called, and a price-fixing agreement effected which endured until 1874.

During the war, business in general was excellent. Although the United States Navy manufactured its peacetime cordage requirements in Navy Yard ropewalks, expansion forced it to buy outside. The Navy, and the merchant marine in general, began "going steam"; but all early steamships except the monitors and river and sound steamboats carried an auxiliary sail plan, and all without exception required large amounts of rope for cables, warps, hoists and the like. By 1863, manila line had recovered from its all-time low of 7½ cents to 18 cents a pound, and next year it reached a record high of 25 cents. The Plymouth Cordage Company, which had paid no dividend in

1858, paid 3 per cent in 1859 and 1861, 6 per cent in 1860, 14 per cent in 1862 and 1863, 20 per cent in 1864, and 30 per cent in 1865.

When the war ended, Plymouth Cordage was a well established company forty-one years of age, and Bourne Spooner was still Treasurer and General Manager. It remained to be seen whether or not it could hold its own during the ensuing period of expansion and combination in the reunited nation.



III. EXPANSION AND STRUGGLE, 1865–1900

From Generation to Generation

BOURNE SPOONER, as we have seen, was the dominant figure in the Plymouth Cordage Company until his retirement in 1870 at the age of eighty. He was succeeded as Treasurer and General Manager by his son Charles W. Spooner, who held the combined office for twelve years but suffered from ill health during all but the first five. Gideon F. Holmes, the one-time office boy, took over most of Spooner's duties in 1875 and in 1882 became officially Treasurer and Manager. He died on 21 January 1911, still in service, and was succeeded in both offices by his son Francis C. Holmes, who carried on for 27 years until 1938. That was when the present incumbent, Mr. Ellis W. Brewster, took over. Thus the key position in Plymouth Cordage was held by Spooners for 58 years and by Holmeses for 53 years.

In 1867 the directors voted that their senior member

in point of service should preside at all meetings. It was thus that the office of President of the Company came into being. The first was Dr. Nathan Cooley Keep, the eminent Boston dentist and scientist who had been advising Bourne Spooner on tarring thirty years before. He was succeeded in 1875 by John Augustus Dodd of Boston who, in 1859, had followed as director his father John Dodd, an original stockholder. John A. Dodd in 1890 was succeeded by Caleb William Loring, grandson of the original Caleb Loring. And when Caleb William Loring died in 1897 he was followed, after a five-month interval, by his son Augustus Peabody Loring, who retired in 1936. Thus, if we include Caleb's ten years' treasurership and the three years' presidency of Augustus P. Loring, Jr. (1939–42), the Company has had fifty-nine years of Lorings as presiding officers.

The biographical annals of the Plymouth Cordage Company do read somewhat like those of Israel before the Captivity; yet no "dead hand" was allowed to foul their lines. In 1880 the capital stock of the Company was $200,000 and the annual output twelve million pounds of cordage. In 1911 the capital stock par value was $2,500,000 and the output was one hundred million pounds. By 1949 the output was not quite so great, but the par value capital stock was $6,762,195 and the operating surplus $6,157,841.

This record is the more noteworthy because Gideon Holmes was given the Spooners' job with considerable hesitation. The Spooners had been merchants in the

old-time meaning of that now undistinguished word — "one who traffics to remote countries." Charles Spooner had been an East India merchant and lived in China before he returned to Plymouth; but Gideon Holmes was a home-town boy who had grown up in the Company's employ. He had already shown pre-eminent skill as a manufacturer, but he had never traveled or had much to do with buying and selling; would he catch on to the essential mercantile aspects of the cordage business? Some of the stockholders sold out when they heard of "that ex-office boy" being chosen Treasurer, but they were mighty sorry when his election was followed by the declaration of a stock dividend of 150 per cent!

New Markets

By the end of the Civil War it was clear that if the Company were to survive it must seek other than maritime markets. The American merchant marine, hard hit by depredations of Confederate raiders, and still more by intense competition in the eighteen-seventies, failed to recover its tonnage of the clipper ship era; and ships were using less rope than before. Wire standing rigging rapidly replaced hemp,[1] and rope cables, except for small craft, were already a thing

[1] Even here, however, Plymouth kept something, since good wire rigging requires a rope core, and Plymouth soon started supplying these "centers" to the wire rope manufacturers; does to this day.

of the past. The Down East sailing fleet, which kept the American flag flying in Far Eastern waters until 1900; the New Bedford whaling fleet; tugboats with their strings of barges; coastal steamers with their numerous hawsers and warps, still consumed a lot of rope but not enough to warrant concentration on the maritime market.

Three new opportunities were soon opened, and Plymouth was quick to take advantage. The first was for power transmission. Until the day of electric drives, rope offered the most economical means of conveying power, and indeed was the standard means until the end of the century, since any number of ropes could be taken off a single drive wheel. Ordinary manila hawser-laid rope was unsuitable, and cable-laid rope burned up with internal friction. So the Plymouth people consulted engineers and probable customers and worked out several different types that were suitable for this work. The best, in the long run, proved to be a 4-strand rope with a 3-strand lubricated heart which reduced to a minimum the internal friction of the fibres due to their constant flexion at high speeds. With a growing manufacturing industry this proved to be a profitable and expanding market.

The second new opportunity was oil drilling. Natural oil was first struck in western Pennsylvania in 1859, and even before the Civil War thousands of fortune-hunters stampeded into the petroleum-soaked triangle between the Allegheny River and Oil Creek.

During the Civil War oil production increased from 21,000,000 to 104,000,000 gallons, and $500,000,000 capital was sunk in the industry. And the later expansion of the petroleum industry into Texas, California, Oklahoma, Mexico and Venezuela is one of the most amazing in recent history. Now, oil wells required a lot of rope, and not any rope would do; parting was too expensive. Here, too, Plymouth Cordage with the aid of engineers worked out special manila lines for special uses: the derrick line, 3-strand with heart; the bull rope and catline, 3-strand cable-laid or 4-strand of a special lay with heart; the cracker, a very tight cable-laid rope which is spliced to the end of a wire line to give the necessary spring for rapid well drilling; and manila drilling ropes of lubricated yarn, cable-laid, to give extra elasticity and abrasion resistance.

The third and most important new market was for binder twine. By 1880 most western wheat was reaped by machinery, but the self-binding models of that era used soft iron wire to bind the sheaves. That proved troublesome, as bits of wire got into the flour mills, damaging the machinery, and even into the flour — a "vitamin enrichment" which customers did not relish. Gideon Holmes, as acting manager during the illness of the younger Spooner, undertook the manufacture of a special binder twine. This met such a "long-felt want" that during the first year of production almost 400,000 pounds of it were sold. Within

a few years the Company's production of binder twine approached that of rope in bulk; and in 1921 it was about forty per cent of the Company's output in value.

In recent years the market for binder twine has fallen off, owing to the increased use of "combines" which not only reap but thresh wheat. Again Plymouth took up the slack by producing a sisal baler twine — the first made in the world — for the automatic-pickup hay baler.

An amusing anecdote of marketing binder twine turns on the method of securing the bales. The cylindrical "balls" in which it is wound are packed six to a bale, which is wrapped in a strong brown paper bag and lashed with a length of line made of various sorts of waste materials. Some of Plymouth's competitors followed suit; but one of them later endeavored to save a few cents by machine-tying the bales with a very light line. A howl went up from his customers in the West, for it seems that the farmers counted on these short lengths of rope to make headstalls for their horses and cattle, and for other uses around the barn. So Plymouth goes right on using rope ties for binder-twine bales.

Another important market for twine was found in the nets and seines, lobster-pot warps and fish lines of the fishing industry.

The cowboys of the western plains provided another new market. Plymouth began making a manila lariat rope in the early eighteen-nineties. It had always made the manila running rigging for the *America's* cup

defenders since the original *America's* victory in 1851. In 1903 the big sloop *Reliance*, Plymouth rigged, again successfully defended the famous old cup. Two years later a representative of the Company showed a sample of *Reliance's* rigging to a saddling firm in Dallas, Texas. Pronouncing it perfect for roping cattle, the firm asked if Plymouth Cordage could make lariats of the same fibre, size and lay. Plymouth could and did. Hence the "Plymouth Silk Finish Lariat Rope," commonly called "Yacht Lariat," which became as famous and as standard on the range as the Stetson hat and the Colt revolver. Since their first appearance, the Plymouth lariats have been constantly improved, chiefly by incorporating suggestions made by cowboys.

Lariats represent a very small item in Plymouth's total sales. Yet they are an item to which Plymouth gives a great deal of attention and in which it takes a particular pride. For it is one of those ropes by which men work and live, and few ropes have to be right in so many ways as a good lariat. It must be of a specially hard lay, to give it the proper stiffness and life and yet withstand abrasion. It must have the proper weight, the right "sail," and strength to absorb the shock when a horse is stopped quickly and the weight of a steer is suddenly thrown onto the rope. It must be absolutely uniform and retain its qualities through a long life under all sorts of weather conditions. Finally, it must have that almost indefinable quality of the right "feel" in the hands of an experienced roper.

Since Plymouth met these exacting specifications,

its "Silk Finish Manila Lariat" became a general favorite on the range and in rodeos, as the recent literature of the rodeo attests.[2]

Foreign Labor

For all these new markets and uses, new machinery and more steam power were necessary. It was the practice of the Company to finance improvements out of earnings and then issue new stock *pro rata* to the existing stockholders to cover the investment. Changes were also made in the hours, the pay and the character of the working force. In 1875 ten hours constituted a day's work, and wages ranged from a minimum of $.85 for boys to a maximum of $3.75 a day, with an average of about $2. In 1892, in compliance with a new Massachusetts law, the weekly hours were reduced to fifty-eight by closing the plant at noon on Saturday.[3] The night shift received a premium in the form of the same pay for three hours less work.

The first sharp change in the composition of labor came about 1880 with an inflow of Northern Italians. They were doubtless first employed, as recent immigrants generally were in New England factories, because going wages were no longer sufficiently attrac-

[2] Clifford P. Westermeier, *Man, Beast and Dust; the Story of the Rodeo* (1947), Guy Wesdick, *The Rodeo* (1949).

[3] The working hours in 1892 were as follows: December, January and February, 7 A.M. to noon, 1 P.M. to 6, except 1 to 4 on Saturdays. Other nine months: 6.30 A.M. to noon, 1 P.M. to 6, but no afternoon work Saturdays.

tive to the native-born. Some of the Italians were peasants, others had worked in factories in Lombardy; but most of them took to ropemaking quickly and efficiently. Naturally these newcomers entered at the bottom; the best of the Germans, Irish and native-born Yankees in the Company's employ who had been spinners or operatives moved up to be foremen, machinists, overseers or the like.

In 1924 the employees who had served the Company for twenty-five to fifty years and upward were enumerated. Breaking down this list by racial origin from an inspection of the names — not a strictly accurate test since some foreigners Anglicized their names, and some Irish names are indistinguishable from Scotch or English — we reach the following result:

NAMES OF LONG-TERM EMPLOYEES IN PLYMOUTH CORDAGE COMPANY, 1924 [4]

	TERM OF SERVICE IN YEARS					
	50 & UP	40 TO 50	35 TO 40	30 TO 35	25 TO 30	TOTAL
Yankee, Scotch & English	7	11	14	15	20	67
Scandinavian & German	5	6	15	22	14	62
Irish	3	1	1	1	1	7
Italian	—	—	1	12	30	43
Portuguese	—	—	2	2	—	4
Other	—	1	—	2	3	6
Total	15	19	33	54	68	189

[4] Plymouth Cordage Company, *One Hundred Years of Service*, pp. 95–100.

Several interesting conclusions may be drawn from this table. In the first place, the total number of employees who had served twenty-five or more years — 189 — is very large for a company whose total labor force was 226 in 1874 and 1779 in 1924. Next, it shows that the Yankees, Germans and Italians were the "stickers," while the Irish, whose numbers in the plant were at least equal to those of the Germans in 1864, did not stay long; and that the Portuguese who now (1949) are ahead of the Italians in numbers, had only recently arrived. Of the forty-three Italians in the long-term list in 1924, one had been in the Company's employ since the eighteen-eighties, twelve more had entered it before 1895, and thirty more before 1900.

Around the turn of the century Italians came in even larger numbers, so that by 1910 persons of Italian birth constituted almost ten per cent of the population of Plymouth. Today, many sons and even grandsons of employees are in the works; but the tendency of the Italians has been to go into retail trade, as that of the Irish has been to obtain local offices or go into politics. An appreciable number both of Italians and Portuguese have entered learned professions such as law, medicine and teaching. They represent a growing and respected part of the population of the old Pilgrim community, and attest the value of Plymouth Cordage as a "melting pot."

Portuguese began entering Plymouth Cordage as

employees in considerable numbers after 1900. Unlike the Italians, most of the Portuguese did not come directly from Europe but from the Portuguese "colonies" at Provincetown and New Bedford. They were Azoreans or Cape Verde Islanders whose forebears had come to Massachusetts in the whaling ships. An appreciable number came directly from the Western Islands and found their first American jobs in Plymouth Cordage.

Gentlemen's Agreements and Pools

For the Old Ship Brand and other Plymouth products, peacetime brought no fair wind. The post-war gale of prosperity came to an end on "Black Friday," 18 September 1873, when the great banking house of Jay Cooke failed. That touched off a spell of doldrums that lasted four or five years.

In consequence of the bad state of business that followed the panic, the same cordage manufacturers of Philadelphia, New York and New England who had been parties to the price-fixing agreement of 1861, together with others who had joined since, met to revise their rules. The new agreement of the Cordage Association, dated 1 July 1874, was of the same general character as that of 1861, with more detailed and specific provisions as to prices, terms of credit, freight charges and the like. There were no sanctions to this

agreement, other than a solemn pledge of the members "to each other as men of honor and integrity." The short history of this agreement illustrates a cynic's definition of a "gentlemen's agreement" as one that is always broken. Both honor and integrity weakened when the wholesale price of manila line sagged from 17½ cents (1873) to 13½ cents (1875); and it was to descend to 10¼ cents in 1879 before recovering.

The Cordage Association met again in 1875 and on 23 April adopted a series of resolutions, beginning with the statement that "the time has now arrived when, in our unanimous opinion, owing to causes not now necessary to be alluded to or enumerated, it is necessary for us . . . to take a new departure." The only new departure, however, was a renewed appeal to honor and integrity to maintain a new price-fixing agreement.

The first break in this 1875 "gentlemen's agreement" occurred at Chicago where the cordage dealers, declaring they had honestly attempted to maintain the Association's price of rope and twine, but had been persistently undercut by certain local dealers who apparently were receiving supplies from various "traitors," announced that they would no longer observe the Association's fixed prices for cordage. The Association was unable to repair this breach. And as prices declined to new lows and the need for concerted action became greater, the pressure to cut throats became irresistible. A really new departure was called for.

The answer was a pool. Agreed to by the Cordage

Association in 1877, it went into effect on the first day of 1878. In addition to fixing prices at levels which afforded a fair profit in comparison with the cost of raw materials, each manufacturer had to make the Association a monthly return of cordage delivered, and pay into the pool two cents a pound for all that was delivered for sale in the United States. The money in the pool was then redistributed to the member companies according to a quota of sales allotted to each, by a committee of the Association. The effect was that every company that exceeded its annual quota lost two cents a pound for that excess, while every company that sold less than its quota received a bounty of two cents a pound for the difference. It was a wonderful system for penalizing production effort and rewarding lack of enterprise. The quotas, however, were annually revised by the committee, with reference to the amount actually sold.

A table of the quotas allotted during the first three years, and of net payments into the pool and receipts from it, will illustrate the operations of this pool better than any description.[5]

[5] Compiled by Mr. Lewis from the records of the P. C. C. The names of the competing companies have been represented by letters, owing to the delicacy of the Plymouth Cordage Company in respect to some firms which are still its competitors.

OPERATIONS OF CORDAGE POOL, 1878–1880

MEMBER COMPANY	QUOTA, IN PER CENT OF TOTAL			FINANCIAL SETTLEMENT FOR 1880	
	1878	1879	1880	PAID INTO POOL	REC'D FROM POOL
Plymouth Cordage Co.	11.25	13.5	18.75	$18,821.90	——
Company A	11.25	10.5	11.5	——	$3,924. 53
Company B	11.25	11.33	11.2	607.70	——
Company C	11.25	15	10.5	11,094.57	——
Company D	10	10.75	10	1,928.52	——
Company E	8	8.4	11.2	5,472.99	——
Company F	7	5.67	4.33	——	9,844.64
Company G	8	8	10	1,811.34	——
Company H	4.5	3.75	3.25	——	5,512.31
Company I	3	2	2	——	6,463.21
Company J	2.5	3	2.5	2,234.29	——
Company K	2.5	2	1.5	——	2,979.11
Company L	1	1.5	1	2,062.62	——
Company M	2	0.67	1	——	6,825.75
Company N	1	0.88	0.1	——	1,997.58
Company O	?	?	?	——	6,476.80
				$44,023.93	$44,023.93

It will be observed that Plymouth's quota was exceeded by none in 1878, that it increased each following year, and that Plymouth paid into the pool during these three years 70 per cent more than its nearest competitor. For Plymouth Cordage consistently oversold its quota, paying the two cents a pound penalty. The directors followed this policy with a long view to securing a leading position in the cordage market, shrewdly suspecting that the pool would not last long. When and if it dissolved, Plymouth Cordage would be stronger than before. So, while some members of the

Association deliberately underproduced, taking their bounty of two cents a pound for rope they never made, and so lost customers; Plymouth consistently built up sales until, by 1885, its quota was 20 per cent.

Fire and Reconstruction

The payoff came in 1885, owing to a fire on 3 January which appeared to be a disaster, but proved to be a blessing in disguise. The fire started in the Picker House, a long, narrow, two-story wooden building where waste fibre was worked over and tow was removed by picker machines. It burned rapidly and fiercely, and the flames were sucked through a passageway to the Field Mill where the preparing machines, lappers and some of the spinners were located. That went too. These key buildings were well covered by insurance, but until they could be replaced Plymouth's productive capacity was crippled. However, the Brick and Slate Mills and the old ropewalk were untouched; so by running the remaining machines day and night, and through various ingenious expedients of Gideon Holmes, Plymouth Cordage managed to produce over six million pounds of rope and twine in 1885, which was 57.8 per cent of its production in 1883. Now some benefit was derived from the pool. Plymouth's quota, owing to its persistent overselling, had been raised to

twenty per cent of the Association's total for 1885; and insofar as it was unable to meet that quota, the Company received two cents a pound from the pool. This amounted to $28,262.71 in 1885 and $41,679.02 next year. The stockholders' dividend for 1885 was ten per cent — not bad for a concern that had been almost half burned out!

In other ways, too, the fire of 1885 proved to be beneficial. It cleared the way for an extensive modernization program which the Board of Directors had been discussing for some time without coming to any decision. The ashes of the great fire were not cold before the leading mill engineering firm of Lockwood & Greene was called in to survey the premises and prepare a complete plan for reconstruction and rearrangement. In pursuance of this plan, work was at once started on the No. 1 Mill. Its original dimensions, before later additions, were 180 by 412 feet, with one story and a basement. On one side a new power room was installed, with an Allis-Corliss tandem horizontal steam engine of 1200 to 1500 horsepower. Next, in 1888–89, the old Brick Mill and Slate Mill, which had maintained production after the fire, were taken down and replaced by a 171-foot Rope Room addition to No. 1. Therein were installed the best of the old machinery, some large new forming and laying machines, and about a hundred spinners. A new brick headhouse replaced the old one in 1893, providing better space for reeling and covering rope after

the laying. This building also housed a few machines, including some for making corset twine — a popular Plymouth product of the eighteen-eighties and eighteen-nineties that will no longer be found in the catalogue!

The Struggle with the Octopus

We may profitably break off in 1893 our account of the modernization program, which only world wars could interrupt, because that year marked the climax in the greatest struggle in the Company's history — its resistance to monopoly. The rise and fall of the National Cordage Company is one of the most dramatic stories in the annals of American big business. And, in that struggle, Plymouth played the rôle of David.

Combination and monopoly rose, phoenix-like, from the ruins of the old Association and pool. The pool of 1885 broke up two years later. Rumors were rife that some member companies were not playing fair, when one of them was detected making shipments in excess of its sworn returns to the Association. An inquiry to the treasurer of that company, with a request to revise its return, received an impudent refusal. This incident aroused such hard feeling that no new pool could be formed. Obviously, some more hard-and-fast system of maintaining prices was wanted.

While the Plymouth management was calmly considering various proposals, a bold attempt at combination and monopoly in the shape of a super-cordage company had been incorporated under the laws of New Jersey on 20 July 1887. Popularly known as the Cordage Trust, its official title was the National Cordage Company. The capital, one million dollars, shortly increased 50 per cent and eventually 1500 per cent, was originally taken up by the member companies. National Cordage was in fact a combination of the four leading New York cordage companies, the William Walls, Lawrence Waterbury, Tucker, Carter & Co., and Elizabethport Steam Cordage. These were Plymouth's leading competitors in the domestic market. The president and directors of National Cordage were experienced officials of these four companies. At the outset, this combination controlled about 2800 spindles and about 30 per cent of the country's output. Orders were offered by contract to the lowest bidder among the member companies, certainly an excellent method to stimulate efficiency and cut costs.

National Cordage might well have driven its competitors to the wall by these perfectly legal methods — since it never was a Trust in the sense of the Antitrust laws — if its directors had been content to expand slowly and legitimately. The first sign of the megalomania that led to their ruin was an attempted corner of the market on abaca, the fibre from which manila rope is made. Under pressure of National Cordage

manipulation, the price of abaca rose from 7½ cents to 9 cents a pound between July and September 1887. A similar drive was made to corner sisal. "We have all the raw material, and I can't really see how other people are going to manufacture cordage without sisal or manila," boasted the National Cordage Treasurer in a newspaper interview. But in the spring of 1888, when the Company was in too deep and temporarily withdrew its support of the abaca market, the fibre tumbled to $6^{5}/_{8}$ cents, and National Cordage took a heavy loss.

In the fall of 1888, National Cordage began making agreements with the principal jobbers of abaca not to sell to the Company's competitors except through English firms at half a cent premium. In the spring of 1889 abaca rose to 13 cents. Plymouth, fortunately, had a large supply on hand and profited by the consequent high price of manila rope. In fact, it made the largest sales in its history so far, during the fiscal year 1888–89. But prospects for the future looked grim. Through the years 1889 and 1890 the price of the fibre varied as much as three and four cents a month. A situation had occurred, with which many American manufacturers are now sadly familiar — the uncertainty spawned by fluctuating price and inconstant supply of essential raw materials, coupled with intense competition in the market for finished goods.

There was a temporary truce in January 1890 when nearly all American cordage manufacturers, including

National Cordage and Plymouth, joined a new "gentlemen's agreement" to fix prices and stabilize the market. But business began to deteriorate, prices fell, and on 1 November National Cordage informed the other members that it would no longer play ball.

Thereafter, no holds were barred. National Cordage, hoping to close the Plymouth mill for lack of raw material, even detained in New York a cargo of abaca belonging to Plymouth Cordage, apparently through buying a controlling interest in the ship. When Plymouth sought to take possession of its property by writ of replevin, National Cordage had the ship anchored outside the three-mile limit, in order to be beyond the jurisdiction of American courts! But there were good lawyers on the Plymouth Board of Directors, and a threat to start criminal proceedings released the ship to inland waters and brought her cargo to Plymouth.

Having failed to corner the supply of raw material, National Cordage tried to get control of cordage machinery, by a series of contracts with the British and American makers thereof, to the effect that in return for a subsidy they would sell no machinery to National's competitors. The John Good firm of New York, whose machines were widely used, was reputedly paid $200,000 a year to refrain from producing cordage themselves and for refusing their machinery to others. Fortunately Plymouth Cordage had just installed new machinery, after the great fire.

Next, National Cordage started to acquire rival

cordage works by lease, option or buying a controlling interest in their stock. By October 1890, ten such companies, in places so widely spaced as Boston, New Orleans, Ohio and Kentucky, had fallen under their control, adding 1136 spindles to the 2800 with which the combination had started. It is said that some smart operators built new mills in order to sell out to the trust, and that one of these was provided with wooden shafting painted to look like steel.

The time now seemed ripe to bring refractory independents into line by acquiring their stock. All the familiar arguments in favor of bigness and monopoly, which have mulcted American investors of billions of dollars, were displayed. Stockholders of coveted companies were assured that the saving of costs incident to big-scale production and rigid control of raw material were economic and patriotic necessities. It was the trend of the times, the wave of the future; resist it at your peril! Any company so rash as to preserve its integrity and resist absorption would be driven to the wall, forced into bankruptcy. Agents were even sent to alarm the employees of independent companies with the threat of losing their jobs; Plymouth lost a number of good workers by this means. So successful was this campaign of bluster and intimidation, backed by funds borrowed from banking and brokerage houses, that within two years National Cordage acquired 4050 additional spindles, and by the opening of 1892 had about ninety per cent of the rope and cordage output

of the United States under its control. It had become the greatest industrial giant of the era; more powerful even than American Tobacco and American Sugar Refining.

Plymouth Cordage was impervious as Plymouth Rock to all this bullying and blandishment. The directors, in the words of Gideon Holmes, "by an investigation into the financial status and methods of the National Company, became convinced that it could not compass the economies in manufacture which had been proposed, that it had undertaken a great deal more than it could accomplish, and that it would soon become involved in financial embarrassment." But they had a very bad moment when it was discovered that National Cordage, through buying or somehow getting control of the estates that owned its old rival the New Bedford Cordage Company, had incidentally acquired a substantial block of Plymouth Cordage stock; and that the directors of the Octopus had been buying in the open market Plymouth stock, which was held for them on a twenty-five per cent margin by a Boston banker. When you added them up, these holdings were dangerously near a majority of the outstanding stock. A few attractive offers to individual stockholders — and National Cordage could afford to be generous, as Drexel, Morgan & Company had promised their financial backing once Plymouth was swallowed up — and National Cordage would have a

majority. It might then close down the works entirely, as it had done with several of the already absorbed ropewalks; or siphon out its assets to finance further operations, as has happened to several absorbed New England companies even in our own times.

At this juncture, on 8 August 1890, the Plymouth directors made a shrewd defensive move that saved the day. They persuaded the stockholders to place control of their stock in the hands of three trustees, Gideon F. Holmes, James E. Dodd and Augustus P. Loring,[6] with authority to take such action for the protection of the Company and of their interests in it as they might deem expedient. Although this action was wholly voluntary on the stockholders' part, almost all resisted the selfish temptation to sell out at an inflated price, and before long a majority of the stock was in the hands of the trustees. A few days later a notice was posted in the plant, assuring the employees that control of the Company had not changed, and that it would continue to operate as before.

Not even this trust agreement could have saved the Company from absorption if efficient production and the high quality of Plymouth products had not re-

[6] It may be inferred that the last-named, a noted Boston trustee and author of the still standard treatise on the rights and duties of trustees, thought this up. The Hon. George G. Crocker, who succeeded Mr. Dodd as trustee in 1891, made a remark at the 1899 anniversary which should be treasured as an example of the humor of understatement: "As no satisfactory offer for our property was received by the trustees, we are still struggling along as an independent corporation." The trust agreement was dissolved after the danger had passed.

tained most of its customers and won new ones. Owing to the recent modernization, Plymouth's production during the years of struggle had increased almost 400 per cent. Net profits declined from $120,569 in 1890 to $79,594 in 1891; but in 1892, the very year when National Cordage reached the height of its power, with 90 per cent of potential production under its control, Plymouth made $336,330 profit. In each of these years $75,000 was distributed to stockholders, and in 1893, $100,000.

While Plymouth was stoutly defending its independence and flourishing in so doing, National Cordage took the road of frenzied finance that led it to ruin. The original capitalization of $1,000,000 had increased to $15,000,000 in 1890, of which $5,000,000 was in 8 per cent preferred stock. The common stock was held by the member companies, but the preferred was offered to the public and the proceeds used to purchase the ten plants which National had under lease or option. In 1891 a pool was formed of the $10,000,000 of common stock and placed in the hands of the New York financier, James R. Keene. Under his expert manipulation National Cordage Common rose from $73 in March 1891 to $142 at the end of 1892; and in 1891 it paid a dividend of 10 per cent. Not content with this inflated structure, the National Cordage directors in January 1893 declared a 100 per cent stock dividend. But already there were fissures in the im-

Plymouth Cordage Company plant about 1910. Note changes in mill architecture since earlier views. No. 1 mill is the one with the square brick tower, Nos. 2 and 3 with long roofs, superintendent's office near the old millpond, Men's Club in white house at right. Captain's Hill, Duxbury, in background.

Sisal steamer at Cordage Dock.

The Welland, Ontario, Canada, Plant, built in 1905, to supply the demands for cordage products in an expanding Canada.

Plymouth Cordage Plant in 1927, air view. Note employees dwelling, the new warehouses, left. (*Fairchild Aerial Surveys, Inc.*)

pressive façade. The machinery manufacturers refused any longer to withhold machines from National's competitors. An immense inventory of rope and binder twine was carried, and the Company borrowed $5,000,000 on it in the form of demand loans and short-time paper. When these obligations fell due, it decided to issue $2,500,000 more of preferred stock. But this time the directors misjudged their market. A bear raid, in which Keene was a suspected participant, knocked the new preferred and the old common stock down to nominal figures, the Company's paper covering the inventory was dishonored; and on 4 May 1893, a receiver was appointed for National Cordage Company. That failure was what touched off the panic of 1893.

The epilogue, the story of attempted reorganizations of National Cordage need not detain us long. The first, the United States Cordage Company, failed in 1895. Next came the Standard Rope and Twine Company, organized 1896, reorganized 1905, liquidated in 1912. Respecting that company, the historian of National Cordage remarks that at the turn of the century, "The Plymouth Cordage Company, the best managed concern in the trade, with a capital of $1,500,000, was doing a larger business than the Standard with a nominal capital of $20,000,000." [7] Plymouth had emerged from the battle stronger than ever.

[7] Arthur S. Dewing, *History of the National Cordage Co.* (1913), p. 50.

The Victor Celebrates

A recession in business but not a disastrous one, followed the panic of 1893; yet scarcely a year passed without an addition of new machinery or a new building. In 1891 the management, which so far had rubbed along with what office room the old grist mill afforded, gave itself a modest brick Office Building. Complete with the oak trim of the period and steel vaults, it cost only $10,000.[8] Sixty new spinners with preparation machinery in the same year; 113 new spinners in 1893; a new warehouse that year, a second in 1894 and a third, 60 by 500 feet, in 1898; new rope machines in 1895; fire engines and a firehouse next year; more new rope machines and nine balling machines in 1897; a machine for laying four-stranded power-transmission rope in 1899. The War with Spain interrupted both the production and shipping of manila and doubled its price, but Plymouth had very large stocks and was able to weather that short crisis handily. Total production in 1898 was about 45,000,000 pounds, and the following year it was 2,500,000 pounds better than that.

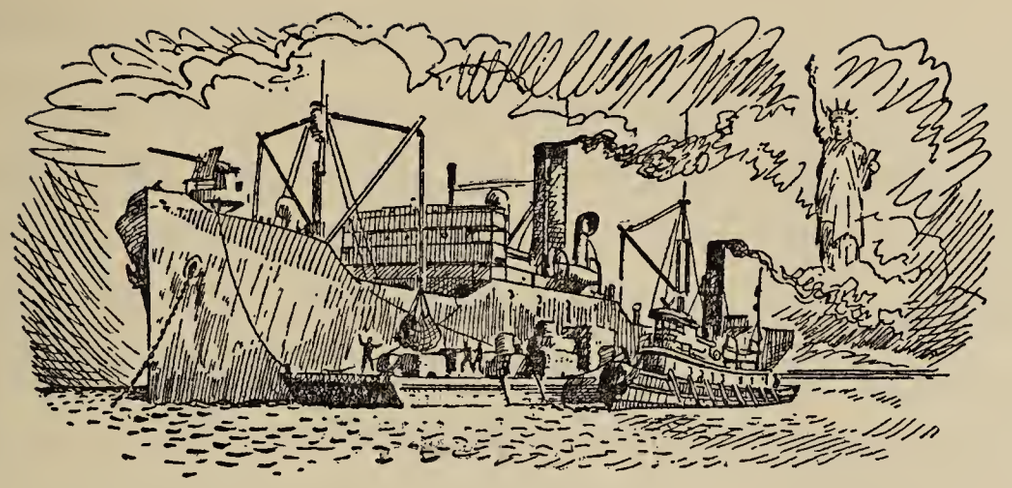
Most appropriately, the Company in 1899 made the largest profit and built the biggest addition to its

[8] This is the northern end of the present Office Building; the southern part was added in 1920.

works since 1824; for that was the seventy-fifth year of its existence. It was also the fortieth year of Gideon Holmes's employment. The works were shut down on October 7, and open house was kept for 950 workers and 200 stockholders. The Loring Library was presented; a program of track and field sports was held for men, boy and girl employees; Mr. Holmes made some reminiscent remarks and George G. Crocker, an eminent Boston lawyer, and a director of the Company, made a valuable historical address. The great new building that marked this anniversary, the No. 2 Mill, had only been authorized in February but it was well enough along in October to be used for serving dinner to all hands. It was 558 feet long and 142 feet wide, two stories and a basement, together with a new engine and boiler house, picker house, and the 220-foot chimney which still vies with the monument to Myles Standish on Captain's Hill, Duxbury, as the most prominent landmark on Plymouth Bay. No. 2 Mill was built especially for making binder twine. It was operated by a compound vertical engine of 1500–1800 horsepower which, with the 800 new spinning machines, took some time to install. The first twine was produced in September 1900. Next year, eight machines for making baling rope and twenty upright ropemaking machines of various sizes were added to the Company's equipment.

Thus, Plymouth Cordage turned the century with modern equipment, a righteous and comfortable sense

of a well-earned victory over a powerful adversary, and the brightest of prospects. Nobody anticipated that the next half-century would bring two world wars, with more difficult and absorbing problems for the Company than even the struggle with the Octopus.



IV. WELFARE AND WAR, 1899–1924

Why Welfare?[1]

EVER SINCE large-scale manufacturing began in New England, there had been two schools of thought and action respecting labor policy. In the Fall River and New Bedford area, complete laissez-faire prevailed. Employees found their own housing, had little or no help from employers in case of accident or sickness, and whatever education they received was provided by the community. In the Boston and Essex County area, on the other hand, a semi-paternal policy was initiated after the War of 1812. Francis C. Lowell, who had studied Robert Owen's experiments at New Lanark in Scotland, appreciated the fact that to keep working people healthy and happy something must be done by management to ease the transition from farm to factory; that a manufacturing company had a social responsibility for the welfare of its employees. Until

[1] The word "Welfare" has suffered through its association with municipal charitable activities for the poorest people; but it was the word used at Plymouth, so I use it here in preference to the more sophisticated "Social Services."

the twentieth century the state intervened largely to prevent grosser exploitation of workers by excessive hours or conditions dangerous to health; state welfare programs involving sickness insurance, retirement pensions, adult education and recreation are of very recent growth. Before the New Deal, such things were provided, if at all, by manufacturers who followed the Lowell rather than the Fall River tradition. Among such firms, the Dennison Manufacturing Company of Framingham, and the Plymouth Cordage Company have outstanding records of social service.

Plymouth stood midway between the two contrasting areas. As long as the Spooners were dominant in management, the laissez-faire system prevailed, except for the original and necessary housing of 1825. North Plymouth was never a dreary mill town, but a pleasant and salubrious site equal to those shores of Plymouth and Duxbury Bays which have been taken up by summer homes of well-to-do Bostonians. And the Cordage labor force for many years was composed largely of independent Yankees who could take care of themselves.

As the nineteenth century drew to a close, the need for a change became apparent, especially to Boston directors like the Lorings who were allied by marriage with the Lowells [2] and shared their feeling that cor-

[2] The Lowells were early stockholders in the Company. Augustus Lowell was a director for 8 years in the 19th century; and his son A. Lawrence Lowell, later President of Harvard, followed him for 3 years and was succeeded by his cousin William Lowell Putnam in 1903, for 14 years, when another cousin, J. A. Lowell Blake, became a director.

porations must do something for the workers' welfare. The presence in the Cordage working force of several hundred Germans and Italians, people of a high type morally but ignorant of the English language and American ways, brought "welfare" to the front. The Company decided that it must assist the incorporation of these people into the general stream of American life.

Caleb William Loring, third President of the Corporation and grandson of the first Treasurer, on the occasion of his last visit to Plymouth before his death in 1897, remarked that "he wished to do something for the operatives, something to make them happier." This pious intention was translated into action by his son Augustus Peabody Loring, who had been Clerk of the Corporation since 1884 and was advanced to the presidency in 1897. Gideon F. Holmes, the self-made man who had actually managed the plant since 1875, fell in with Loring's views, and appointed the superintendent of grounds and buildings, William E. C. Nazro, to take charge of Welfare work. He remained at the head of it for twenty-eight years; since 1910 as the head of a special department. Nazro, an architect by training, had been reading Ruskin. He believed that wage-earners like other people had a yearning for beauty and for betterment. He regarded industrial welfare work as "the seed for one of the greatest educational processes the country has ever known."

In seeking motives for the welfare program we are about to describe, a cynic or a Marxian would say that

it was a shrewd move to keep the proletariat contented with low wages. And everyone must admit that employee benefits did pay the employer. Plymouth Cordage could not raise wages above those paid by its many competitors and survive; but it could and did withhold from profits the modest sums necessary to give its employees greater happiness and security. Yet there was a lot more to it than mere calculation. The present writer, who knew Augustus P. Loring, has no hesitation in declaring that his natural benevolence, and his recognition of the essential worth of the working man, were the main motives behind the numerous welfare activities at Plymouth. A portly, ruddy, jovial man who reminded one of Dickens's Mr. Cheeryble, Loring exuded cheer and good will to friends, neighbors and employees alike. He had many charitable interests, notably Near East Relief of which he was a director and a prominent contributor; he would talk for hours to anyone who would listen, about welfare in Plymouth or rehabilitation of displaced persons in Greece. Except for sailing, in which he delighted, Loring took no part in the clubs, sports or other social activities common to Bostonians of family and wealth; next to his own family, the Plymouth Cordage employees were closest to his heart. Even in his old age, in the depth of the great depression, he was more concerned with the welfare of the employees than with that of the Company.

The Loring Library, presented in 1899, one of the

first evidences of the new social policy at Plymouth, was wholly paid for by Augustus P. Loring and stocked with some three thousand books by himself and his brother and sisters. They saw to it that good selections of German, Italian and Portuguese literature were included, so that employees in the course of their Americanization would not forget their native culture.

This jubilee year 1899 marks the real beginning of Welfare at Plymouth. Number 2 Mill, built that year, was provided with rest rooms and a ventilation and heating system which was as close as engineers fifty years ago could attain to air-conditioning. And the first large housing program was started.

From time to time since 1825 the Company had built tenements of the normal mill-village type for its workers, but in 1899 it started an ambitious housing program of very different and superior quality, with 21 two-family homes of the architecture then vaguely called "colonial." Each family unit comprised five to seven rooms and a cellar, a modern bathroom, a front lawn with place for a flower garden, and a back yard big enough to grow vegetables and raise poultry.[3] The Company also laid sidewalks and a sewage system at its own expense, since the town would not. The rents were very moderate. And, more important, the appearance, finish and accommodations of the houses were of the sort then sought after by the younger business and professional men with incomes much larger

[3] Electric lighting and central heating plants were installed a few years later.

than any factory operative could earn, so that to live in them gave an employee's family self-respect and standing in the community.

The Company encouraged emulation among its tenants by giving annual prizes for the best-kept garden and the best poultry yard; annually it held a fair on Labor Day, at which prizes were given for vegetables raised by the operatives and for cakes, embroidery and the like made by their wives.

As demand increased, more houses were built between 1910 and 1920, so that by 1924 the Company owned 125 dwelling houses, containing 351 tenements (including the original ones then almost a century old), renting from $1.20 to $4.50 per week; the whole was appraised at about two million dollars and originally returned 2½ to 3 per cent on the investment. In addition, land was procured and lots were sold at cost to employees who wished to build for themselves, and building loans were made by the Company at a very low interest.

After housing came educational activities. The earliest was a free kindergarten for employees' children, opened in 1900; a special building was constructed for it later, and the enrollment reached ninety or one hundred. A carpentry school was opened for boys and classes in sewing, dressmaking and millinery, basketry and drawing, for women and girls. A cooking school was opened by the Company in 1901, "to teach young girls how to prepare good food economically"; the average attendance between that year and

1927 was between fifty and one hundred. At various times, classes in canning and preserving were held.

For seventy-five years the Company's employees went home for their meals if they lived nearby, or brought their lunches in the traditional dinner pail, which was supposed to be full only when the Republican Party was in power. In 1902 one floor of the Superintendent's office was fitted up for the men to eat their lunch in. First hot coffee was provided, then sandwiches and fruit were added, at the request of bachelor workers who had no one to fill a dinner pail for them. These earliest quarters were too small to accommodate more than a fraction of the employees, but this innovation was so successful that before the end of the year Edward R. Harris, the largest stockholder of the Company and son of the second Treasurer, built Harris Hall at his own expense. This was a company restaurant where light refreshments could be had, a complete dinner was served for 25 cents, or a worker could eat his own lunch. Harris Hall had to be enlarged twice before 1920, and at present (1949) serves an average of 225 dinners a day in addition to about 525 sales of light refreshments. An additional cafeteria in No. 2 Mill serves meals for the force in that building, and there is a traveling milk and sandwich service brought to the workers at their machines.

The earliest service of a medical nature provided was a nutrition clinic established by Augustus P. Loring at his own expense around 1900, where children of employees could be examined and their parents ad-

vised about diet. Some years later he was immensely gratified when a state inspector declared the Plymouth Cordage employees' families to be unusually well nourished for factory workers. Following a scarlet-fever epidemic in 1903, the Company engaged two visiting nurses to be constantly in residence. They conducted a clinic and classes in nursing and infant care, and later a resident doctor was engaged to direct the clinic and the nurses. An informal pension system to long-term employees, at the discretion of the management, was established before 1900. The stipend was $6 per week, until 1916 when it was raised to $7. By 1921 this informal system was made available to all employees, and put on a "sliding scale" basis — one per cent of the last annual pay, multiplied by years of service.

In 1920, when the Pilgrim Tercentenary was approaching, the Company built an auditorium where visitors to Plymouth could be entertained. The celebration passed but the auditorium remained as a place where concerts, lectures and theatricals could be given by and for the employees. A gymnasium class was organized there, and equipment provided. Even earlier a community bathhouse had been built on the beach owned by the Company, within easy walking distance of the operatives' homes; by 1924 there were sea bathing facilities for 750 persons a day, with a swimming instructor provided by the Company. Instruments and uniforms were provided for the Plym-

outh Cordage Band, an excellent outlet for the musical tastes of the employees, and a community asset. A nearby colonial farmhouse was purchased in 1921 and fitted up as a men's club with bowling alleys, pool tables and other apparatus for indoor sports. Membership in this Cordage Club is available to all male employees at very moderate rates.

It would be hard to exaggerate the pride that the directors and officers of the Company showed in these welfare activities. They felt that they were indoctrinating immigrants in the "American way of life" and enabling them to be self-respecting citizens. Plymouth Cordage put on Welfare as well as Production exhibits at the St. Louis World's Fair of 1904 and the Lewis and Clark Exhibition the following year; and each Welfare exhibit was awarded the gold medal. In 1905 the Company received first prize for its solution of a factory housing problem in a contest held by the International Exposition at Milan. Another compliment to the Company was a request from the Panama Canal Administration to borrow its welfare director, Mr. Nazro, to start welfare work among the Canal employees. He willingly went, but gladly returned to Plymouth.

When the history is written of that great social movement which, for want of better terms, is called employees' benefits or workers' welfare, Augustus Peabody Loring and William E. C. Nazro will doubtless stand high. As the latter predicted, and as William

Bradford had predicted of the Plymouth Colony three centuries earlier: "Thus, out of small beginnings greater things have been produced."

Welland and No. 3

While scarcely a year passed between 1900 and 1915 without additions or improvements to the Company's plant or mechanical equipment at Plymouth, the most important departure was the building of a separate plant in Canada, in 1905.

The Dominion already imposed a twenty-five per cent duty on United States rope, which was prohibitory; and there was every expectation that it would do something similar to protect Canadian-made binder twine. The Canadian Northwest was rapidly moving into top place as the world's producer of wheat, and Plymouth directors wished not only to preserve their binder-twine market but to enter the Canadian market for rope.

Welland, Ontario, near Buffalo and only fourteen miles from Niagara Falls, was chosen because of its access to abundant electric power and excellent transportation facilities by railroad, lake and canal. Fibre could be brought there almost as cheaply as to Plymouth, and the freight on twine to the Canadian wheat fields was naturally much less. In 1905 Welland was an attractive village of some 1800 people, located in

the "Garden of Canada." Plymouth Cordage was the first major industry to locate there. The Company purchased 180 acres bounded on three sides by railroads and the Welland Canal; plans of the plant, to cost almost three quarters of a million dollars, were drawn by Lockwood, Greene & Company. The first brick was laid on 3 November 1905, and the first bale of binder twine was turned out exactly 55 weeks later. The Welland plant started right off with one-third the capacity of the 83-year-old Plymouth factory.

Much the same Welfare institutions were established at Welland as at Plymouth. Housing again had to be provided; and the dwelling houses erected for the office staff and the operatives were enthusiastically described by the local paper as "ornamental and creditable alike to the town and the company. They are of frame, with shingle sides of a style much in vogue of late . . . modern in design and equipment, fitted with bathrooms, hot and cold water, with all appliances for comfort, convenience and sanitation." Miss M. Olive Bradley, a trained nurse who had completed her course at the Toronto General Hospital, was brought to Plymouth to study the clinic and visiting-nurse system there, and in the spring of 1908 she instituted a similar program at Welland. She was the first industrial nurse in Canada.[4] The same year Plymouth Hall, a recreational center, was built at Welland; and the same

[4] That is the title of an article about Miss Bradley by Sarah A. Wallace in *The Canadian Nurse* for May 1948.

pattern of sewing, cooking and kindergarten classes was reproduced.

When the Welland plant was built, a separate corporation, the Independent Cordage Company, was established to handle the sale of its products in Canada. And in 1915 the Company built a warehouse at Fort William on Lake Superior for the more effective distribution of its products in western Canada.

Returning to Plymouth, another major addition was the erection of No. 3 Mill, 430 by 114 feet with two stories and a basement, in 1907. Together with the machinery, which included more than 500 spinners, preparing machines and compound rope-laying machines of various sizes, No. 3 Mill cost $310,000. Power was supplied by an internal-combustion gas machine. The first yarn was spun in No. 3 on 19 March 1908, and the following year it was the scene of a celebration — the golden anniversary of Gideon F. Holmes's connection with the Company.

There was a great assembly of talent to honor Mr. Holmes. Edmond J. Lindsay of the great binder-twine firm of Milwaukee; the Honorable George G. Crocker; the Honorable William W. German, Member of the Dominion Parliament for the Welland District; and the Reverend W. W. Dornan of the Church of the Pilgrimage in Plymouth, made addresses. Richard McLean, who had been Holmes's first boss in 1859, on behalf of the older men who had grown gray with him in the service, and also on behalf of all the em-

ployees of the Plymouth Cordage Company, presented him with a silver loving cup.

Number 3 Mill marked the conclusion of the material expansion that began immediately after the fire of 1885. But it was not the end of improvements. One significant departure in 1912 was the deepening of the harbor channel to the Company's dock so that the small steamers which loaded fibre in Yucatan could dock at Plymouth. The first steamship to use the new dock, and one of the first to enter Plymouth from a foreign country, was the Munson Liner *Heighington*, with 6030 bales of henequen from Progreso, Yucatan, on 8 March 1913. A dock warehouse was constructed which saved sufficient freight from Boston to prove a good investment. For the Company was then using 20,000 to 25,000 tons of the agave fibre annually, and the rail haul from Boston cost a dollar a ton.

Incidentally, the routing of these steamers to Plymouth made that old customs district once more an important port. By the end of 1948, 252 steamers had brought over $45,000,000 worth of fibre direct to Plymouth from Progreso; in addition, during the ten years 1931–41, thirty-two steamers had brought $1,250,000 worth of sisal to Plymouth from Haiti. The federal government built a new customs house whose collections of duties put Plymouth once more on the importing map. And during prohibition the federal agents had a new job in searching the little steamers for ingeniously concealed caches of a particularly villainous Mexican brand of "Scotch Whisky."

The traffic manager, who was responsible for bringing the steamers to Plymouth, had a good deal of trouble keeping freight rates to the West within a compass that allowed competition from Plymouth, so remote from the wheat fields. When in the summer of 1912 an acute shortage of binder twine was heralded in the Canadian Northwest, he organized a "Binder Twine Special," a thirteen-car train carrying 650,000 pounds of twine, which left North Plymouth at 3.45 P.M. 21 August and arrived Winnipeg at 12.00 noon on the twenty-fourth. Five days from the time it left the factory, Plymouth twine was binding wheat sheaves, at Brandon, two thousand miles from Plymouth.

In 1916–17 a new power plant was built to relieve the overload on the engine of Nos. 1 and 2 Mills and to supply power for No. 3, where the gas machine had proved unsatisfactory. A turbine and generator were installed, and electric drives put into No. 3 Mill.

In the meantime, the Company had weathered the longest, and indeed the only important strike in its history.

The Strike of 1916

World War I, breaking out in August 1914, created at first a business depression in the United States which shortly gave way to a war boom, in which Plymouth

Cordage shared. The increased purchases of wheat by the Allies stimulated the demand for binder twine, and the ships that took food and munitions to Europe needed rope. In October 1915 the Company issued 5000 shares of new capital stock, which sold at 50 per cent premium, adding a quarter of a million dollars to its surplus account. It was paying dividends of eight per cent per annum on the par value. Fibre costs, however, were high. Manila became scarce and henequen, now controlled by the Mexican government, rose too. As Canada entered the war with her mother country, many of the workers at the Welland plant joined the armed forces or migrated to better-paying munitions plants so that, despite the urgent demand for binder twine in the Canadian West, that plant could no longer be run at capacity. Then suddenly, without warning, a strike exploded in the Plymouth plant on 17 January 1916.

The management at the time seemed to be completely mystified by this strike; and no wonder, since there was no warning in the shape of previously presented demands, no organization, and for several days the Company could discover no demand except a 33 per cent increase of wages, which seemed preposterous. At that time the German secret service was instigating strikes in American factories that were producing for the Allies, and it was naturally suspected that this was another case of the same sort. But it is now reasonably certain that the 1916 upheaval was, purely and simply, a strike for higher wages at a time when the workers

were being hard pressed by a rising cost of living. Mr. B. Preston Clark of Boston, a director of the Company for ten years past who took a great deal of trouble to inform himself about the strike, made the following sensible analysis of the causes shortly after it was over:

> *The nervous tension under which we are living due to the war has played its part. The fact that there was a real and continuing intimidation was also a real factor. But neither of these simply or together could in my judgment have gotten the men out and kept them out so long. There was more to it than that.*
>
> *Food costs had risen and living was closer than it had been. Other mills in New England had made wage advances and in an inarticulate kind of way the men felt that it was about time for a raise.*
>
> *Also, while in general they were entirely satisfied with their treatment at the hands of the Company, there were certain things that made them uneasy: —*
>
> 1. *The idea that the Company was rich and could if it would pay them more.*
> 2. *The idea that if cost of living continued to advance, they could not live on the wage.*

There is, I believe, a general agreement among economists that real wages declined in the United States during the fifteen years following 1900; certainly that was true of New England factory labor. Unrestricted immigration, mutual suspicion among the various racial elements that prevented organization, lack of interest by the American Federation of Labor in the unskilled, and other factors as well, combined

to keep wages from rising with the cost of living. From Mr. Clark's notes it is clear that the Plymouth Cordage workers were in a very poor position in 1916, relative to their predecessors in the middle or late nineteenth century. A few figures from his notes will show this:

WEEKLY WAGES FOR UNSKILLED LABOR IN PLYMOUTH CORDAGE COMPANY

1894	$8.10	58-hour week	
"Some time before 1906"	8.10	54 " "	
1906	8.52	54 " "	
1912	9.00	54 " "	
1915	9.00	54 " "	plus 2 per cent bonus

Bonuses were also paid for piecework beyond the normal production expected of all workers.

ACTUAL EARNINGS OF THE 1596 ADULT MALE WORKERS AT PLYMOUTH CORDAGE COMPANY, SECOND WEEK OF JANUARY 1916

NUMBER OF WORKERS	EARNINGS
32	under $ 9.00
1214	9.00 to $ 9.99
174	10.00 to 10.99
105	11.00 to 12.99
64	13.00 to 15.99
7	17.00 and over

In addition, there were 250 women employees, whose basic wages were $6 per week, and 75 minors who presumably earned even less.

At the same time the cost of living, especially in items like lentils, olive oil and macaroni that the Italian workers depended on, increased by leaps and bounds. Worse was yet to come, but it had gone far enough by 1916 to cause real hardship to marginal workers, and they were very uneasy. The High Cost of Living had been a political issue since 1910; Henry Cabot Lodge was almost defeated for the Senate because his initials were the same, and Eugene N. Foss rode into Congress on that issue. It was so all over the world. Romain Rolland in *Jean Christophe* tells of the *malaise* of French workers in 1914 — their wages were the same, but every time they bought something it cost more.

It is a safe guess that the Plymouth worker of 1894 to 1900, with $8.10 a week, had much better real wages than the 1916 worker with $9 a week.

Another imponderable factor entered into the situation. Through the power of advertising and the circulation of newspapers and magazines new wants had been created, and the factory workers of 1916 was no longer content to live like his predecessor thirty years before. His wife wanted nice clothes for the children and various modern household gadgets; he wanted a small second-hand car or a motorcycle. It was "un-American" to be without such things. American business created these wants, but common workers who demanded the wherewithal to satisfy them were apt to be told that business could not stand the strain.

Wage statistics for Massachusetts industries in 1910, at the time of the great strike in the Lawrence textile mills, indicated that Plymouth's rate of 16.6 cents per hour — the rate of 1912–16 — was slightly lower than wages paid in the textile industry (17.8 cents) and well below those paid in the boot and shoe (28.2 cents), the electrical (26.3 cents) and other industries; the Plymouth Cordage rents, however, were much lower than those charged by company and non-company houses in other industries.

Nobody claimed that a worker could raise a family in 1916 on wages of $9 a week, even with a low rent. It would be necessary for the wife and one or more of the children to have a job. That was what textile operatives had come to — whole families working — but there were few jobs for women and less for minors in Plymouth Cordage, and opportunities to earn wages elsewhere in the Plymouth area were not very numerous.

For once the Plymouth Cordage management had been caught napping. There had been no labor trouble in the plant within the memory of man. The recent Welfare developments and the apparent gratitude of the employees for them seem to have given management the illusion that Plymouth Cordage was one big happy family. And to a considerable degree it was so; witness the lack of violence in the strike, and absence of bitterness after it was settled. But the Company had not taken cognizance of the fact that it

was paying insufficient wages for people to live on decently.

The thing that touched off the strike, it seems, was an unfounded rumor that the Company would raise wages on 1 January 1916. On Sunday the sixteenth a self-constituted committee, the membership of which was never disclosed, including some men in the Company's employ and some who were not, went around to workers' homes urging a general strike next day and threatening them with violence if they reported for work. Next day, Monday 17 January, trouble started among some of the younger and unskilled ballers — the men who operated machines which wound binder twine into balls — in No. 2 and No. 3 Mills. The foreman could not persuade them to return to work, or learn of any grievance except that they wanted more money.

Although none but the ballers stopped work on Monday, there were jeering crowds of pickets at the gates, and stone-throwing, on Tuesday; and on Wednesday, 19 January, so few workers reported that the plant was closed down. Additional police were called in, from as far as Boston; but there was very little violence at any time.

The strike began without any organization, and a curious feature of it was the repeated refusal of the strikers to let themselves be organized by the American Federation of Labor or the Industrial Workers of the World, who were ready and eager to do so. The strikers appeared to regard this as a domestic issue be-

tween themselves and the Company, in which they did not care for outside intervention. The first concrete demands were made at a mass meeting of strikers at the Plymouth Arena on the night of 18 January. They decided to demand a $12 a week minimum for men and $8 for women. Augustus P. Loring and Francis C. Holmes sent a message offering to meet a committee of the strikers and consider their grievances. Accordingly the mass meeting chose a committee, representing the several nationalities employed, which met Loring and Holmes. The President and Treasurer offered to refer the whole matter to the organization already provided by the Commonwealth to handle such matters, the State Board of Conciliation and Arbitration; to abide by its recommendations and, in the meantime, to grant a wage increase of five per cent. When the committee reported this offer back to the mass meeting, it was received with "choruses of negatives in three tongues." The committee was promptly discharged, leaving the strikers again with no organization; and about 1200 of them staged a parade that afternoon.

It would be tedious to relate the day-by-day progress of negotiations. They were slow because a large number of the strikers were Italians, Portuguese or Germans who understood no English and had to have everything explained through interpreters. Three successive committees were appointed to deal with the management, but every proposal of A. F. of L. organ-

izers or I. W. W. agitators to take charge was hooted down. The strikers held out for $12 a week minimum; management repeatedly offered its five per cent increase and to abide by what the State Board recommended as fair. On the Company's unilateral request, hearings were begun by the State Board in the Plymouth Armory on 27 January. The workers had ample opportunity to air their grievances, almost all of which were low wages; except that it was evident that the piecework bonuses were unpopular, and that some of the younger men wished to abolish Welfare as a tax on them for the benefit of married employees. The Company claimed it was paying better wages than in most mill towns and that a five per cent increase was all it could afford; but it promised to abide by findings of the State Board.

On 1 February the Company's offer was again voted down by the strikers, but they were beginning to weaken. Hearing that large numbers wanted to return but were prevented by intimidation, the Company blew the whistle for work two days later. Few then responded, but more came through the picket lines next day, about 125 reported for work on 7 February, No. 1 Mill was back in partial operation on the 8th; on the fourteenth most of the Germans were back on the job, the Portuguese followed, and finally the Italians. On 15 February the strikers voted to accept the Company offer, and on the sixteenth, less than a month after the work stoppage, the plant was in full

operation. All strikers who desired re-employment got it. Nobody was discharged because of his part in the strike.

The State Board communicated its decision on 5 April. The Company, wishing to make a settlement that left no scars of ill will, bettered the award. Note the following table: —

STATE BOARD AWARD AND COMPANY'S INCREASES OF PAY, APRIL 1915

	FORMER WAGES	STATE BOARD AWARD	COMPANY PAID
Beginners, girls and boys	?	$ 6.00	$ 6.00
Women of 1 year's experience	$6.00	7.50	7.50
Unskilled men workers	9.00	10.13	10.13
Next highest grade	9.60	10.56	10.80
		PER CENT INCREASE	
Next highest — up to $12.00 a week		7½	10
Men formerly receiving $12.00 up		5	10

That was the last strike, to date, in the Plymouth Cordage Company plant.

It so happens that the 1916 strike has received a notoriety beyond its deserts, through the reputed connection with it of Bartolomeo Vanzetti, who with Nicola Sacco was executed in 1927 for the murder of a paymaster and his guard at South Braintree in 1920. The present writer, who followed this world-famous case at the time, is convinced that both men were innocent of that crime; and that Vanzetti was also innocent of a holdup at Bridgewater, for which he had

previously been found guilty at a session of the Superior Court in Plymouth. This is not to say, however, that his statements about the Plymouth strike are correct.

In a pamphlet written after his conviction for the South Braintree murder, Vanzetti said:

> *I had participated in the strike of the Plymouth Cordage Co. workers in 1915* [*sic*]. *This company is one of the greatest money powers of this Nation. The town of Plymouth is its feudal tenure. Of all the local men who took a prominent part in the strike, I was the only one who did not yield or betray the workers. Towards the end of the strike, the "Boston Post," a quasi-exclusive creature of the Cordage Company, said that "About one hundred Italian Anarchists are keeping the strike on, against the will of all the other strikers." That was an exaggerated half truth. But of all the local men who had taken a big part in the strike, I was the only one who, instead of being compensated, was blacklisted by the company, and subjected to a long, vain and useless police vigilance. And I wholly realized that the Cordage Company would never forget or forgive me for the little that I had done in behalf of its exploited workers.*[5]

This statement has frequently been quoted as true, in spite of its absurd allegations about Plymouth Cordage and the *Boston Post*. It seems to have been assumed by everyone that Vanzetti was a striker. Subsequently Vanzetti and his sympathizers firmly believed that his later troubles were due to getting in bad with Plymouth Cordage. Now, it is not true that Vanzetti was a striker. In the famous trial he

[5] *Background of the Plymouth Trial*, p. 6 (n.d., probably 1923).

admitted as much, indirectly — that he left the Cordage employ voluntarily because they wished to shift him from an outdoors to an indoors job which he did not like, so he went to work on the state breakwater near Plymouth Rock.[6] Consequently there was no question of his being "compensated" or taken back to work at the Cordage Company after the strike was over; and all strikers who wished to return to work were taken back, with no questions asked. Moreover, the payroll records of the Company prove that "Bartholomew Vanzetti" (also called "Bert Vanzetti") entered its employ some time during the first half of 1914 and left it on 20 January 1915, almost a year before the strike began.

Vanzetti's participation in the strike rests entirely on his own statement, and on those of fellow anarchists and other sympathizers, several years after the event. His rôle was certainly an inconspicuous one, for his name is not mentioned in the detailed accounts of the strike published in the local newspaper, or in Preston Clark's full notes; or on the committees appointed by the strikers, or in an article on the strike in the anarchist organ *Revolt*, or in the State Board of Arbitration proceedings.[7] Apparently nobody in the Company ever heard of him as a strike leader until he be-

[6] *The Sacco-Vanzetti Case. Transcript of the Record of the Trial* (New York 1928) II, p. 1694.

[7] An article by Irwin Grannich in *Revolt*, the anarchist organ, for 5 Feb. 1916 (I, no. 5, p. 7) claims that the anarchists were controlling the strike "through Luigi Galleani, the Nestor of Massachusetts anarchism," but does not mention Vanzetti.

came otherwise famous; and he was certainly not blacklisted, as the Company blacklisted nobody. The probability is that Vanzetti was of the unnamed members of the self-constituted committee which went about to workers' homes on the Sunday preceding the strike, urging the work stoppage by threats and intimidation, and that he continued violent agitation throughout the strike, and was opposed to the settlement.[8] According to his own testimony at the trial he was working on various odd jobs in Plymouth at that time. As an anarchist, whose object in life was to break down government and capitalism, Vanzetti may well have thought it his duty to start with Plymouth Cordage. But whatever his part may have been in the strike, has no bearing on his guilt or innocence of the murder for which he was executed.

World War I

By the time the men had returned to work, Plymouth Cordage was overwhelmed with orders — especially rope for ships and twine for wheat. The whole plant ran at full capacity during the day, and No. 2 Mill ran nights as well. Production in 1916 reached a new high,

[8] Art Shields in *The One Big Union Monthly* for Jan. 1921 (III, no. 1, p. 42), states that Vanzetti "worked night and day speaking, writing articles for an Italian paper and raising money for the strikers, the same as he had raised money for the Lawrence strikers four years before." An article friendly to Vanzetti in *Outlook and Independent* for 1928, (CL, p. 1076), states that his policy in the strike was unpopular with fellow workers, and that "more than once he was pushed off the speakers' rostrum by indignant men."

despite the loss of a month. Management, having learned a lesson about labor the hard way, set up a new personnel department headed by a Manager of Industrial Relations. But there was an unprecedentedly large labor turnover, owing first to the American preparedness program of 1916 attracting workers to the munitions plants, and, after the United States declared war in April 1917, the draft. Manila fibre continued to rise in price and the better grades became scarce, while in Mexico the Carranza government established a government monopoly in henequen which, in the opinion of American consumers, went pretty far. One may add, however, that the *Comisión Reguladora del Mercado de Henequen* defeated its own ends, as it led to extensive planting of henequen and sisal in Haiti, other Caribbean countries, East Africa and the Dutch East Indies.

All such difficulties were intensified when the United States entered World War I; yet Plymouth succeeded in substantially increasing production. The plant was officially declared to be essential to the efficiency of the Navy, which exempted a number of key men from the draft. As a leading producer of binder twine, Treasurer Francis C. Holmes was chosen one of the six members of the sisal committee of Herbert Hoover's Food Administration. Rope sales for the fiscal year ending 31 July 1917 were the largest to that date and were not again attained until World War II; binder-twine deliveries have never been equaled since. The factory ran twenty-one hours a day. Rope was manufactured

not only for the Navy and the merchant marine but for particular war needs — the lighter-than-air "blimps," Army observation balloons and Navy kite balloons.

Through its Food Administration the federal government controlled prices and raw materials in a manner that foreshadowed the controls of World War II. It made all purchases from the Mexican monopoly, distributed fibre to the manufacturers, and fixed prices for binder twine. The cost of manila became so excessive that in January 1918 its purchase was placed in the hands of the War Trade Board. As the prices paid by this board discouraged production, the Governor General of the Philippines abolished controls in the Archipelago in June, to the confusion of the industry; the War Industries Board then imposed maximum prices in July; but by 1 September a free market was restored. Controls on twine fibre lasted until July 1919, when the provincial legislature of Yucatan freed sisal producers from the obligation to sell to the *Comisión Reguladora*.

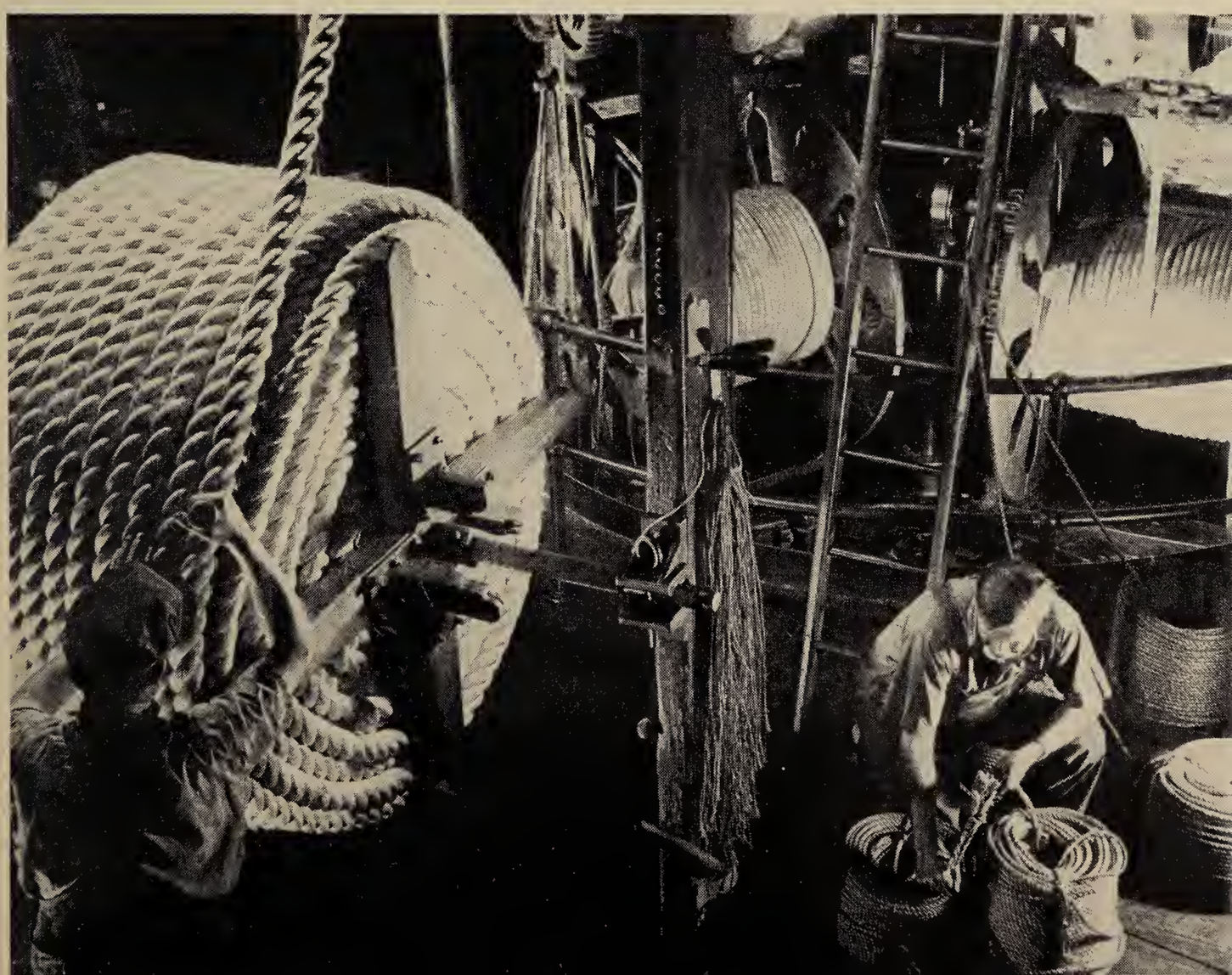
The end of World War I, on 11 November 1918, found Plymouth Cordage "holding the bag" with a large carryover of raw material purchased at war prices, for which it owed some $14,500,000.[9] And the demand for its products was very much reduced.

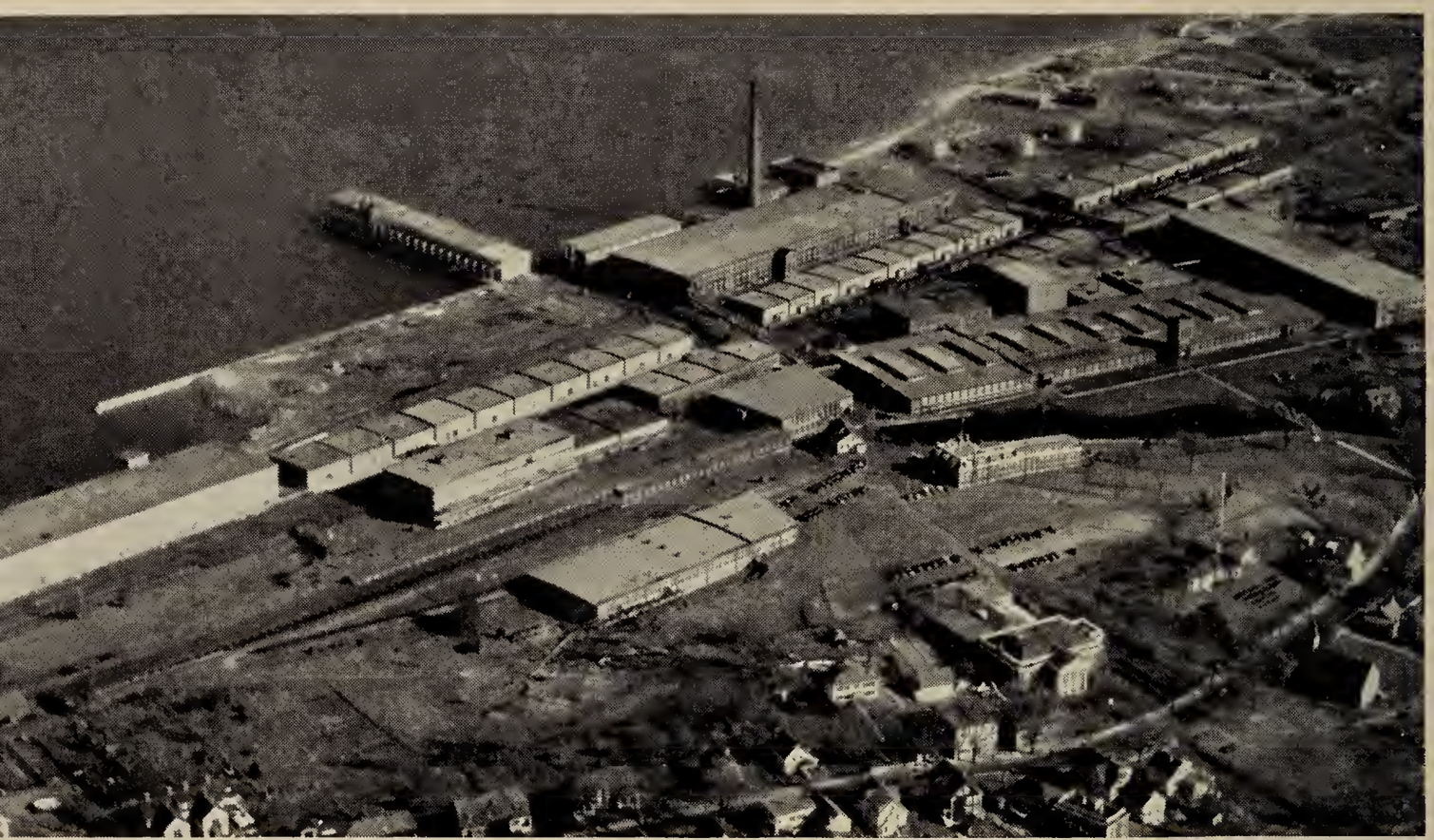
The Company tightened its belt and carried on. In 1919 the inventory of raw material had to be written

[9] These liabilities were in the form of Bills Payable, Accounts, Notes and Acceptances Payable. Neither at this nor at any other time has the Company issued bonds or preferred stock.

Breaking out bales of fibers, 1946. Millions of pounds of manila, sisalana, henequen and hemp move through Plymouth plants every year.
(*Photo by Randall W. Abbott*)

A rope-laying machine. These modern machines turn out a uniform, precision-made product at high speed. (*Photo by Robert Yarnall Richie*)





PLYMOUTH CORDAGE PLANT IN 1949. THERE HAVE BEEN FEW EXTERIOR CHANGES SINCE EARLIER VIEWS BUT GREAT CHANGES IN METHODS AND MACHINERY.

down by about $4,600,000. In 1920 rope sales fell off alarmingly, and by early 1921, owing to government stocks being thrown on the market, were only 25 per cent normal. In March 1921 the Company was forced to lay off men and in April the plant closed down for a week.

The management believed, nevertheless, that the mills could be kept running if production costs were drastically reduced. In September 1921 Treasurer Holmes called the foremen together, explained the situation, assured them that all salaries and wages from that of the president down were to be reduced 20 per cent, that the stockholders' dividends would be cut; the pay per hour would be reduced,[10] but by increasing hours they could take home more pay than before; and he promised that when business improved, wages, dividends and salaries would go up together. The foremen explained this to the gangs, the plan met universal approval from the workers, and was so faithfully carried out that production efficiency was not impaired. There was another 10 per cent wage cut in 1922.[11] Better business conditions came in 1923; wages, salaries and pensions were raised by 11.11 per cent.

[10] The minimum wage had been raised from $10.13 in 1916 to $25 on 1 June 1920, and the work week had been reduced from 54 to 48 hours in April 1919 without decrease in pay. After the reduction to $20 in 1921, the Company was unable to offer a full week's work, which made the actual pay $16.07 for a 40–hour week.

[11] At the same time the full week's work was restored, so the actual pay after this second cut was $18. In 1949 the minimum weekly wage for men at the Plymouth plant was $41.60 for 40 hours, but so few workers were then on the minimum scale that the average of $48 for 40 hours would more nearly correspond to $18 of 1922.

Touched by the offers of some of its old and faithful employees at the crisis of 1921 to lend money to the Company if necessary, the stockholders decided to make it possible for employees to join their ranks. Employees' Special Stock with a par value of $10 was authorized, to the amount of $250,000. It was never completely taken up, but the subscription reached $108,000 in 1928.

Also in 1921 the Company conferred on its employees of 30 years' service and upward a pension based on length of service at 1 per cent a year, and the average pay for the past five years. A 35-year employee, for instance, would receive 35 per cent of his latest average pay; but no pension was less than $7 a week. Employees of 5 years' service and up to 30 years received a free life-insurance policy for one year's pay, up to $2000, in 1923.

The Centennial

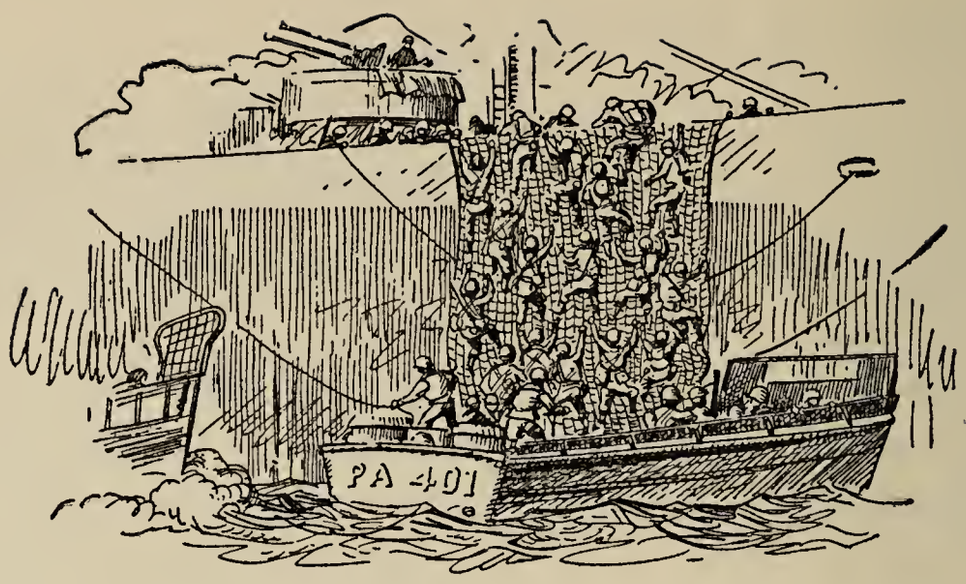
The Centennial Celebration, on 12 June 1924, was marked by more music and festivities but less oratory than the seventy-fifth anniversary in 1899, or the Holmes celebration of 1909. Times had changed! The entire Cordage community, together with invited guests from Boston and Canada, assembled to the number of some five thousand on the Recreation Field overlooking the works. At ten o'clock the Cordage Band of sixty pieces broke out with "The Star Spangled

Banner," as Lieutenant Colonel Willard C. Butler, a veteran of two wars and a Plymouth Cordage machinist of fifty years' service, raised the National Colors to the masthead. Patrick J. Carr, a Civil War veteran who had entered the Company's employee in 1857, raised a special Centennial Pennant. Augustus P. Loring made a commendably short centennial address,[12] after which newly designed Service Emblem Pins were presented. There were fifteen men, twelve of whom were still in Company employ, to receive the fifty-year emblem, nineteen for forty years and upward; and many more in the thirty- and twenty-five-year groups. Prizes were awarded for essays written by high-school students. Luncheon was served in a big tent; and, the gates being opened to all comers, a stage show of "high-class vaudeville" entertained an audience of nearly ten thousand from three to five o'clock. There was then time to visit the special industrial exhibit in the Community Building; the out-of-town guests had already viewed the laying of a mammoth cable in the old ropewalk. In the evening there were fireworks, three successive band concerts, and dancing on three different floors, each with its orchestra, until midnight.

"It was the dawn of another day; the commencement of a new century of endeavor, and a continuance of the same definiteness of plan, purpose and work." [13]

[12] Not to be confused with his longer and excellent "Sketch of the History of the Plymouth Cordage Company," which is also printed in the Centennial Volume.

[13] *One Hundred Years of Service*, p. 18.



V. THE LAST TWENTY-FIVE YEARS, 1924–1949

From Welfare to Benefits

When the centennial was being celebrated in 1924, the great boom that preceded an even greater depression was well under way. The number of employees was almost back to the wartime high of two thousand, and wages had risen again to the wartime level. The fibre situation, too, was much easier. Abaca production had become normal in the Philippines, and was extending into the Netherlands East Indies. The planting of new agave plantations in the Caribbean proved that the Yucatan product no longer had the monopoly.

At the same time there was a gradual lessening of the Company's welfare activities. Labor had become more prosperous and more independent; the community was doing more for workers and there were fewer immigrants who needed special help. The younger and unmarried employees were critical of the kinder-

garten classes and similar fruits of the Loring régime, alleging that their pay envelopes were being docked to favor the married men. Curiously enough, a similar situation had occurred in the Plymouth Colony about three centuries earlier. The Pilgrim fathers, as Bradford recorded, had to yield their original "common course and condition," because the strong and able thought it hard that they should have to work for the women and children of other men, yet receive no more than those who could not do half their work.

Another factor was the dispersion of the workers' dwelling places. By World War I a large number of the operatives were living in Plymouth Town or Kingston and commuting by the electric trolley line that ran alongshore. And by 1929 a considerable minority owned motorcars, which enabled them to live even farther from the plant. Naturally, families of workers living at a distance got little benefit from the educational and recreational facilities provided at North Plymouth, and joined the chorus against Welfare.

This situation and attitude grieved the benevolent Mr. Loring and other directors; but they wisely concluded that Welfare had done its best work. Furthermore, government was beginning to take over many employee benefits formerly accorded by employers, if at all; and this trend was greatly enhanced by the New Deal. So the Company began sloughing off Welfare. The Loring Library and its contents were presented to

the Town of Plymouth, which still maintains it as a branch. The sewing, canning, kindergarten and gymnasium classes petered out, and no more prizes were given for flower gardens and poultry runs. But the free clinic remained, Harris Hall continued to serve excellent meals at low prices, and of course the recently instituted pension system was not rejected by the employees. In 1923 free life insurance to the amount of a year's wages was granted to each employee of at least five years' continuous service; in 1935 lesser benefits were extended to short-term employees, and in 1943–45 a large scheme of contributory sickness, hospitalization and accident insurance was adopted, as part of the union contract. In the end the employees obtained much more security from these modern "benefits" than they had from the old "welfare"; according to the latest calculation, in March 1949, insurance pensions and fringe benefits such as free holidays cost the Company an average of fifteen per cent over wages.

No more workers' dwelling houses were built after 1920, and in 1947 the Company adopted the policy of offering its houses for sale to the tenants. In that year and 1948, 22 buildings housing 76 families were sold. Since World War II the rents of Company houses have covered on the average only two thirds of the expense of keeping them in repair. But there is still a strong demand for the Company houses, both because of the low rents and because North Plymouth remains a

pleasant place in which to reside. The Italians and Portuguese in particular like to be near centers like Plymouth Town and Kingston where many "graduates" (as one might call former employees) of the Cordage Company now operate stores, filling stations and various small businesses.

The same housing and other welfare policies were followed at the Welland, Ontario plant. Of the 50 two-family and four-family houses built for Welland operatives between 1905 and 1918, all but 13 had been sold to employees by 1949.

The directors of Plymouth Cordage, a shrewd and discerning group of men, took a dim view of the terrific boom that set in about 1924. They already had a modern plant; further improvements like complete electrification could wait. They never even considered going in for the high finance in which so many American companies then indulged.

This conservatism stood the Company in good stead during the great depression that began in October 1929. It had no inflated inventories to be reduced, no outstanding debt, no extravagant commitments. The course of the stock market did not affect Plymouth Cordage because its stock was very closely held. Inventories had to be written down, but business did not become definitely bad until 1931.

Neither was the Cordage Company unduly disturbed by the New Deal which came in with President Franklin D. Roosevelt in 1933. Not that the directors and

stockholders were Democrats — far from it! Largely Republican in politics, their general outlook was liberal rather than radical, and many measures of the Roosevelt Administration they found highly distasteful. But they intended to march with the times instead of sulking in their tents; and to a surprising extent they managed to keep up with the procession.

The first disturbing factor was the "bank holiday" declared by President Roosevelt early in March 1933. The Company could get no money for the payroll, so it printed its own scrip in denominations of one to ten dollars, and paid the men with it for about three weeks. Plymouth Cordage scrip was accepted by all the local merchants, with the exception of a chain store, and by the community in general.

The old Welfare Department of the Company, now given the less condescending name of Industrial Relations Office, remembering the strike of 1916, decided to set up political machinery through which the workers could express their wants and air their grievances. In 1934 employee representation was established. The employees by secret ballot elected a permanent committee to meet the management and discuss "all matters of joint interest, such as hours of work, wages, working conditions, and all matters of industrial relations," with provision for arbitration in case management and labor could not agree. This worked so well that it was unnecessary to refer any dispute to the National Labor Relations Board. In the year 1934,

which witnessed much labor violence, including the great automobile strike at Detroit, a nation-wide textile strike and a general strike in San Francisco, everything was calm on Plymouth Bay.

After April 1937, when the Supreme Court sustained the validity of the Wagner Act, it became evident that the Plymouth Cordage employees, to comply with the law, must be unionized. Yet the repugnance of the cordage workers to affiliation with an outside labor union was still strong, as it had been twenty years earlier. Accordingly, the employees met and voted to form an independent union, The Plymouth Cordage Employees' Association, which superseded the 1934 scheme. Representatives of this union met regularly with the management to discuss and settle any employment question that came up. Both had much to learn on collective bargaining. The Company at this time made a significant declaration when informing its employees of the legal requirements:

> *We believe that the interests of the employees, of management, of the stockholders, and the social interest, will be better served if the views of the employees on questions directly affecting them . . . are had before such questions are decided.*
>
> *We believe that consultation with the employees will . . . find common ground reasonably satisfactory to everyone concerned, and will avoid many mistakes . . .*
>
> *We believe that the long-run interests of employees and Company are the same, and not antagonistic. We believe further that successful consultation with the employees can only be had as this principle is realized.*

Although this independent union appeared to satisfy the cordage workers, it did not last. The end came during World War II, when wages were "frozen" and could not be raised without permission of the National Labor Relations Board at Washington. In 1944, owing to the rising cost of living and the competition of larger wages paid in munition plants, the Cordage Employees Association asked for a modest raise and the Company agreed; but the N.L.R.B. refused to give the required permission. It was then intimated to the employees that if they affiliated with one of the national unions, whose representatives were familiar with the complicated procedures at Washington, they might expect to get what they wanted. An election was held at Plymouth by the N.L.R.B. on 30 November 1944. The employees by a large majority voted to become a local of the Textile Workers Union of America, an affiliate of the C.I.O. The Company recognized this union on 23 April 1945, and through it contracts as to hours, wages and conditions of labor have since been made.

In the opinion of most people who know, neither mechanization nor unionization have impaired the Plymouth ropemaker's pride in his work, or broken the pleasant relationship between him and the Company, a relationship which encourages personal pride and self-respect. Ropemaking never has become an assembly-line industry; it has always required manual skill and dexterity.

Short of War

Plymouth Cordage entered World War II with a new administration which, as usual, was a smooth continuation of the old. Francis C. Holmes retired as Treasurer and General Manager on 1 April 1938. He was succeeded by Ellis W. Brewster, a descendant of the old ruling elder of the Pilgrim Fathers, who had previously served as Assistant Superintendent and Vice-Treasurer.

In January 1939 occurred the death of B. Preston Clark, who had succeeded Augustus P. Loring as President of the Company at the latter's resignation in 1936. Augustus P. Loring, Jr., great-great-grandson of the original Caleb and a director since 1913, then became the seventh President of the Company. He held that position until 1942, when Mr. Brewster added the title of President to those of Treasurer and General Manager, while Mr. Loring became Chairman of the Board of Directors. The Brewster-Loring team is still in charge on the 125th anniversary. Plymouth Cordage would hardly be itself without a Loring on the quarter-deck of the Old Ship.

The great depression did not end until after World War II broke out in September 1939. All cordage sales were still below normal. Foreign producers of twine had entered the American market, which was not

protected by any tariff. The introduction of harvesting "combines," which threshed grain as it was reaped, lessened the demand for binder twine. Keen competition in the rope market depressed the price of manila line. Fibre prices, too, were low. Manila, in 1935, had fallen to 4 cents, the lowest since 1898; and was only a fraction over 5 cents in 1939; sisal, since 1929, had hovered between 6 cents and 2½ cents.[1] The Plymouth management, as usual, took advantage of these phenomenally low prices to stock up on fibre.

The ostrich-like attitude that a majority of the American public and a substantial part of American business displayed toward the European war in 1939–40 was never that of Plymouth Cordage. They well remembered the neutrality and gradual American involvement in World War I. They were men of sufficient imagination to see that America could not stand idly by, wrapped in an imaginary isolation, while power-mad dictators brought the rest of the world under their sway. They appreciated that the "vast and furious ocean," which William Bradford had called a "main bar and gulf" between Plymouth Colony and the "civil partes of the world," was no longer a bar but an avenue of invasion for any power that could control the sea. So Plymouth Cordage assumed from the first that the United States would probably be involved in the war, and prepared for that eventuality. As an example the traffic manager anticipated the in-

[1] Chart in *124th Annual Report* (1948) p. 7.

terruption of sea traffic by submarines, and undertook as early as September 1939 to arrange an all-rail rate on fibre from New Orleans to Plymouth. After long negotiations, a rate was agreed upon to be effective 26 June 1941. There was not much time to spare, for on 1 November the last steamer from Mexico discharged its cargo of henequen at the Cordage dock; and within three months the U-boats were playing havoc with coastal shipping. But Plymouth Cordage enjoyed a good rail rate from the beginning of American entry into the war, and when the federal government undertook the distribution of fibre, Plymouth's rate became the basis of the government rate.

In the fall of 1939 orders for rope increased sharply, in anticipation of higher prices; and basic fibres, especially manila, followed suit. Before September was out the government, as a first move toward creating a strategic stockpile, asked the Treasury Department to invite bids for 21,000 bales of abaca, chiefly the top grades. The entire cordage industry was thrown into consternation, as any such procedure would have sent fibre prices soaring. On urgent recommendation of the cordage manufacturers, the government was persuaded to keep out of the market for the time being. Recognizing, however, that a strategic stockpile must be started sometime, the trade elected a Cordage Industry Advisory Committee of three, one of whom was Mr. Brewster, to work out a plan that would not upset the industry. The first purchases of manila under this

plan were made in February 1940. In June, when the fall of France brought the Allied cause to a low point, the United States Treasury began buying United Kingdom grades of manila for the British as well. In November the government created a Cordage Industry Committee under the National Defense Act to continue co-operation with the government. Mr. Brewster was chairman of this committee.

During the fiscal year 1940–41, Plymouth about doubled its rope production, chiefly by sales to the armed forces, and binder-twine output also increased heavily. The United States was now in its "short of war" period respecting the European Axis, while the State Department was desperately trying to restrain Japan, whose militarists coveted the Netherlands East Indies, an area of fibre production second in importance only to the Philippines. Mr. Brewster, as chairman of the Cordage Committee, managed to obtain increased cargo space for Javanese sisal and for abaca from Mindanao. Shipments of these fibres were brought nearly up to schedule before Pearl Harbor.

In July 1941, the United States Government began supplying the British with abaca under Lend-Lease. And in August, following the Japanese invasion of Indochina and the freezing of Japanese assets in the United States, it issued General Preference Order M–36 which, with subsequent amendments, was to loom large in the wartime history of cordage. Civilian use of abaca was sharply restricted in order to conserve

fibre and rope for military uses. Sales of cordage were restricted to defense orders, and to "permissive orders" for the merchant marine, oil wells, commercial fishing, mining and power drives. Henceforth, Plymouth rope for non-essential civilian use had to be 50 per cent low-grade manila, 50 per cent sisal or henequen. A year later, when the proportion of manila was again cut by one half, this "50–50" rope seemed high-class. Some of Plymouth's competitors went right on selling ersatz manila under their regular brands; but Plymouth, true to its traditions, hauled out the Old Ship for the duration and refused to fit her out again until she could be properly rigged with manila. The Company explained to its customers just what they were getting, and informed them exactly what to expect in the way of strength and durability from wartime products.

October came, and the government stopped all private purchases of manila fibre. Imports were to be made only by the Navy and the Defense Supplies Corporation. Mr. Jesse Jones appointed a Cordage Industry Advisory Committee to advise him on cordage purchases, and again Mr. Brewster was a member. But sisal was not yet under control.

The Fibre Situation

Our readers do not need to be reminded of what happened at Pearl Harbor at 7.55 A.M. on 7 December

1941. But possibly they do not remember how quickly the Japanese attacked the fibre-producing island of Mindanao in the Philippines. A few hours after Pearl Harbor had been hit, dive-bombers from another Japanese carrier bombed an American warship in Davao Gulf, the principal outlet for abaca cargoes from Mindanao. And on 20 December the Japanese landed an amphibious force at Davao. Export of manila fibre, of which some 165,000 bales were ready for shipment,[2] was thereby ended for the duration. A few sisal-carrying ships cleared from Java thereafter, but several of them never reached home; and by the second week of March 1942, Japan was in complete control of the Netherlands East Indies as well as the Philippines.

The United States was now shut off completely from the sources of about 60 per cent of all its "hard" fibres. What was left? The government stockpile of manila, some 146,000 bales; an estimated 190,000 bales in the hands of manufacturers, which had been "frozen" by a general order of 29 August 1941; Mexican henequen, used chiefly for binder twine; East Africa sisal, hard to get because of shipping shortages and lengthy voyage; and small amounts of Haitian and Cuban sisal.[3]

Owing to the rapid Japanese conquest of Eastern Asia, the American and Allied situation respecting cordage fibres became just as bad as that respecting

[2] At 8 bales to a long ton, that is a lot of abaca, but in addition to these bales ready for shipment there were some 272,000 more bales captured by the Japanese.

[3] Indian jute, a "soft" fibre unsuitable for cordage and unadapted to cordage machinery, was still available and some use was made of it. But it proved to be a very unsatisfactory substitute.

rubber; and the need was equally essential. But cordage never received anything like the publicity that attended the rubber shortage.

The liaison between government and the cordage industry was now strengthened; and in the opinion of many important people at Washington, the cordage industry was outstandingly co-operative. The machinery of co-operation was simple enough. The trade itself set up in New York a Cordage Industry Council of which Mr. Brewster was chairman throughout the war. Every concern producing any kind of cordage, even state prisons where twine was made, had representation on the Council. It met regularly on the day before the Cordage Industry Advisory Committee (of which Mr. Brewster was a member) was to hold a joint meeting with the War Production Board in Washington. Consequently, all differences of opinion within the industry were ironed out beforehand, and the Advisory Committee knew exactly what the industry as a whole felt to be desirable to conserve or produce cordage with a view to winning the war. No substantial differences of opinion developed, because there were good will, loyalty and understanding on both sides.

On 20 February 1942, one week before the Battle of the Java Sea that settled the fate of the Indies, the government issued Agave Conservation Order M–84, the first on binder-twine fibres.[4] This order limited the

[4] *Agave sisalana* (sisal) and *Agave fourcroydes* (henequen).

amounts that could be used by manufacturers, restricted the use of binder twine to harvesting, and began a reduction (which became complete prohibition in October) of the use of agave fibres for making wrapping twines. By May 1942 two more exotic fibres, istle and sunn hemp, came under regulation; and by the close of 1942 the government not only controlled all fibre imports, but all fibre stocks in the hands of the manufacturers.

Canada patterned her restrictions, by which the Welland plant was bound, on those of the United States. Thus there was uniformity in regulation. The Canadian Government controls, however, were much more simple and conducive to prompt action than those in the United States. About one sixth of the American imports of agave fibres were allotted to Canada.

As in the case of rubber, parallel measures were taken to tap new sources of supply. The growth of American hemp, which had all but disappeared, was revived. Seeds were produced and distributed by the Department of Agriculture, subsidies were paid to farmers for growing American hemp, and numerous small mills were built to break the fibre out of the stalks and clean it. The actual crop in 1943 was less than half what had been expected, but the American hemp project did produce some sixty million pounds of fibre at a time when it was badly needed.

Since 1925 the United Fruit Company had been

experimenting with abaca in the Almirante Bay district of Panama; and, on Army and Navy encouragement, it planted another thousand acres with abaca in 1940. Stimulated by the Defense Supplies Corporation, the final abaca acreage in Central America surpassed 28,000 acres; and by 1945 production reached 83,000 bales, amounting to 23,000,000 pounds. This was our only source of manila during the war, and it has continued to be important to this day. At the same time, henequen and sisal production increased in Yucatan, Cuba and Haiti, and a certain amount of sisal was obtained from Portuguese and British East Africa. By 1943 the prospects had become fair for a sufficient supply of fibre for essential Allied war needs.

In other industries as well, the same difficulties were surmounted and similar results obtained. Some American industrialists, however, continued to sigh for the days of laissez-faire and alleged that they succeeded in spite of, rather than by virtue of, government controls. Nobody claimed that at Plymouth. Government controls, undoubtedly irksome in the cordage industry, and as little liked in the old Pilgrim territory as anywhere on earth, were admitted to be necessary in wartime. In 1943, Plymouth Cordage was operating under a War Production Board order that listed over five hundred different rope uses and specified exactly what kind could be made for each purpose. The frequent additions and amendments required constant study, and might mean a change in process, the adap-

tation of machinery to a new fibre or to different proportions of old fibres. Price ceilings meant that the government had to subsidize certain fibres; otherwise American hemp would have been too expensive to use for rope, and cotton yarns could never have been used to "splice out" sisal in binder twine.

There were other troubles, too. First, at the request of the Army, the Plymouth plant was floodlighted as security against prowling enemy agents, when it could be seen farther out to sea than Gurnet Light. No sooner was floodlighting completed than the U-boats began coming around Cape Cod, and the Army ordered a dim-out. Thereafter the plant, which with two shifts worked well into the night, was completely blacked out. When fuel oil became scarce owing to the careful choice of tanker targets by German submarines, the Company started to convert its power plant to coal; then came the coal strike, which halted the conversion halfway. As a further safeguard, arrangements were made to get electric power from New Bedford. The overloaded railroads now had to bring fibre to Plymouth as well as taking the finished product away, but the Company was so helpful in providing full car loadings that on occasions where delivery of a small lot was wanted to fill a rush order, the railroads gladly complied.

In 1943 manpower became a factor limiting production. Most cordage employees, as workers in an essential war industry, were "frozen" to their jobs by order

of the War Manpower Commission, but by November of that year 269 men at the Plymouth plant and 74 in Canada had joined the armed services. Replacements were hard to obtain, yet production was maintained and the coveted E flag was won.

Plymouth Cordage took up every new war problem, whether technique, labor, or government relations, as a challenge; and nobody can assert that its response was inadequate.

So much for the controls and raw materials; now for production, and use of the finished articles.

War Cordage Uses and Production

Plymouth Cordage did not have to "convert," since the rope and twine that it produced in peacetime were, by and large, what the Army, Navy, merchant marine and industry wanted. Take the last-named first; Plymouth Cordage was an "industry serving industry." When an oil shortage developed, more oil wells were drilled and that meant more of the oilmen's special types of rope. Fishermen used more twine for their nets, lumbermen more rope for their rafts, builders more line for their hoists, truck drivers more rope to secure cross-country loads.

A variety of odd ropes were produced from hitherto unknown, or long since discarded, fibres. Istle, jute,

Madagascar raffia and sansevieria, which taxed the ingenuity of Plymouth foremen and the tolerance of the machines, were spun into yarn. Even coir, familiar to old-time seamen as "cyar," the light, floating rope made of hand-spun coconut-husk fibre, was employed for making ships' fenders. Most of these were mixtures and makeshifts, soon abandoned; but one important new rope survived the war. That was nylon. Before the war Plymouth had experimented with nylon, but the short supply and high price of heavier denier filaments precluded production on any commercial scale. The war, and especially aviation, created special needs for a rope with maximum strength and stretch; the high tensile strength and elasticity of nylon fibre were the answer. One important development was glider tow rope, used for towing troop-laden gliders behind airplanes. Another was a special "escape rope" of undrawn nylon which had so much give that it could be used by an airplane to pick up a man from the ground, without landing. And, as soon as the end of the war freed nylon for civilian use, Plymouth put out a nylon lariat rope which jumped into immediate favor with cowboys.

Much of Plymouth's rope went to the United States Navy. Off-hand, one might suppose that the thoroughly mechanized Navy would hardly use rope except for flag hoists and tiller lines on admirals' barges; but that assumption would be wholly wrong. The Navy consumed more rope in World War II than even the

Royal Navy did in the palmiest days of sail. The thousands of landing craft required hawsers, painters and boatfalls; damage-control parties used vast quantities of rope; aircraft carriers consumed rope by the mile to handle planes and lash them down when under way. Fueling at sea required stout rope cables for numerous bow, stern and breastlines so that the two ships could steam at a constant distance side-by-side, while additional cables were used to support the fuel hoses over the intervening stretch of blue water; none but the best manila line would do. The Mobile Service Squadron in the Pacific, one of the major tactical developments of the war, enabled fast carrier forces to keep the sea almost indefinitely by delivering food, fuel, bombs, shells, spare parts, and even airplane engines and replacement personnel at sea; all these persons and objects being passed over from the supply ship to the battlewagons and aircraft carriers on stout manila lines. "If only we had enough manila line," said the commander of one such Service Squadron in his action report after the Battle for Leyte Gulf, "there is nothing we could not supply the Fleet with at sea." By this floating supply system alone, the war in the Pacific was shortened by months.

Plymouth Cordage made much of the rope for the lifesaving nets that were carried in every warship and freighter, and for a time took charge of assembling the nets and floats. Plymouth rope went into the disembarkation nets by which troops went over the sides of

transports into landing craft in amphibious operations. It went into the cargo nets by which the Navy "packaged" supplies for combat landings. There is something moving in the thought that, hard by Plymouth Rock, the second beachhead that the English established in America, was manufactured so much of the material with which Americans secured beachheads in North Africa, Sicily, Italy, France, and on the distant shores of the Western Pacific.

Four Post-War Years

Plymouth had no reconversion problem after victory, but suffered so great a shortage of fibre that in 1946, for the first time in 122 years, a large part of the plant was forced to shut down for a few days owing to lack of raw material. The Japanese occupation of the Philippines, guerilla operations and the cracking-down by the Philippine Republic on the many Japanese-owned abaca plantations in Mindanao, left the manila situation chaotic at the war's end. When production was restored, typhoons, overcropping and "butcher harvesting" kept the output of abaca below peacetime levels. In the Netherlands East Indies, the Indonesian rebels took a perverse delight in destroying sources of their wealth, such as sisal and rubber plantations. The American government continued control of fibre allocation and production in some sort until July 1947.

As soon as controls were taken off, raw material shot up; henequen from 8 to 15 cents a pound; manila from 10.4 cents to the unprecedented price of 25.6 cents a pound, above the last high of 1916. This necessitated higher prices for twine and rope; but the civilian market had so long been starved for Ship Brand Manila and other well-known Plymouth products that the inconvenience was less than might be supposed.

Improvements in machinery never ceased. Electrification of the power plant was resumed at the end of the war and completed in 1948. The year before, the Company began installing new machinery, ordered before the war, as part of an extensive program of modernization which will result in even greater efficiency and improved quality.

Already labor-saving machinery had reduced the number of employees from the pre-war level. At the time of the 1916 strike, as we have seen, a little short of 1600 men, 250 women and 75 minors were employed in the works at Plymouth. In 1948 the total number, including office personnel, was only 1060. In 1927 it required 1300 to 1400 workers to produce a million and a half pounds of cordage per week; but the same results could be obtained in 1945 by one thousand workers. Nevertheless, the payroll in 1945 was considerably greater than that of twenty years earlier. The number employed at Welland in 1948 was about 550.

In May 1938 Plymouth purchased its principal Canadian competitor, the Consumers Cordage Company, which operated two small plants, at Montreal

and Dartmouth. The first was disposed of, but the Dartmouth, Nova Scotia plant, with 160 employees in 1948, is still operated to supply the fisheries and home market in the Maritime Provinces of Canada.

The latest expansion out from Plymouth was the purchase in 1947 of the Federal Fibre Mills of New Orleans, where Bourne Spooner had his first experience in ropemaking. This small plant employed about 100 persons at that time, and about 50 more in 1948. The proximity of New Orleans to Caribbean sources of fibre, and the economy of river transportation to the heart of the Middle West, may prove to be important advantages in the future.

The wartime use of nylon convinced the Company that there was a great future for synthetic fibres. A laboratory had been established in one of the buildings as early as 1920, on the insistence of Director Augustus P. Loring, Jr., who had passed a chemistry course in college which the present writer flunked. This was the first laboratory in the cordage industry. Two years later a competent industrial chemist was obtained to head the laboratory. From that time on experiments were carried on in the effects of strain, dampness, sea water, temperature and the like on ropes made of standard fibres; experiments with synthetic fibres began about 1936. Several new kinds of cordage have been produced; notably a special line for ski tows that does away with the twisting of ordinary rope under tension, which had been the cause of several fatal accidents.

In its 125th fiscal year, ending 30 September 1949, Plymouth Cordage used about $15,000,000 worth of raw materials — nearly all of it fibre; sold almost $23,000,000 worth of rope and twine, made a net profit of $746,672, or $2.62 per share; and declared dividends amounting to $649,172 besides adding $97,500 to operating surplus. Fortune has always smiled on Plymouth's jubilee years.

We have now completed our rapid survey of the first one hundred and twenty-five years of the Plymouth Cordage Company, with all their ups and downs. This history is a shining example of the fact that honesty and integrity do pay off, if combined with wisdom in discerning new trends, courage in solving new problems, and fair dealing with labor, customers and stockholders. It shows, too, that continuity in management and personnel is a priceless asset; that an old, established industry may prosper and expand under the control of local people who have grown up with it, rather than by importing financial wizards, personnel manipulators and other miracle men. Here is an industry that started two miles from Plymouth Rock; and "in spite of great temptations" to migrate to other nations or states, as other New England industries have done, its main plant is still located two miles from Plymouth Rock.

And there, barring a greater convulsion even than World War II, Plymouth Cordage will stay, making twine, spinning yarn, forming strands and laying rope.

APPENDIX A

"GANG" OF STANDING RIGGING OF AMERICAN HACKLED HEMP, FOR A NEW 1000-TON SHIP, OCTOBER 1862

FATHOMS	INCHES' CIRCUMFERENCE	PURPOSE
162	9¼	Fore and main rigging
90	9¼	Fore and main topmast backstays
45	8¼	Fore and main stays
66	7¾	Fore and main topmast stays
64	7	Mizzen rigging, etc.
95	6¼	Mizzen topmast backstays, fore and main topgallant backstays
15	6	Tye, runner and fish pendants
67	5½	Jib stays, guys, etc.
43	5	Lower lifts (for 3 lower yards)
96	4¾	Mizzen topgallant backstays, fore and main topmast rigging
200	4¾	Lanyards
96	4½	Fore and main royal backstays
100	4¼	Mizzen topmast rigging, etc.
118	4	Fore and main topgallant stays, etc.; foot ropes, etc.
160	3¾	Fore and main topgallant rigging, etc.; strapping
160	3½	Mizzen lanyards; strapping
100	3¼	Topgallant backstay lanyards; strapping
290	3, 2¾, 2½, and 2¼	Strapping
1967		

SMALL STUFF

POUNDS	THREAD	PURPOSE	POUNDS	THREAD	PURPOSE
275	18	Ratline	75	15	Wormline
125	15	Ratline	100	12	Wormline
250	12	Ratline for filling	100	9	Wormline
150	6	Ratline for filling	450	2-yarn	Spunyarn
950	3-yarn	Spunyarn			

COMPLETE "GANG" OF RIGGING FOR 400-TON BRIG *Lye Houghton* OF PORTLAND, MAINE, 1865 [1]

FATHOMS	INCHES' CIRCUMFERENCE	STANDING RIGGING, OF AMERICAN HACKLED HEMP — PURPOSE
148	7	Fore and Main Shrouds and fore backstays
50	6¾	Foremast and foretopmast stays
23	6	Main stays
142	5¼	Topgallant backstays, jib stays, etc.
40	4¾	Topgallant stays, etc.
75	4¼	Royal backstays
80	4	Topmast shrouds and lifts, strapping
120	3¾	Lanyards
120	3¼	Lanyards, topgallant shrouds and lifts, strapping
100	3	Strapping, etc.
130	2¾	Lanyards, strapping, etc.
115	2½, 2¼, 2, 1¾	Strapping, etc.
1143		

SMALL STUFF

POUNDS	THREAD	PURPOSE	POUNDS	THREAD	PURPOSE
150	15	Ratline	175	9	Wormline
75	12	Ratline	100	6	Wormline
60	18	Wormline	300		Hambroline
75	15	Wormline	150		Houseline
150	12	Wormline	100		Marline

Also 500 lb. 3-yarn Spunyarn and 300 lb. 2-yarn Spunyarn.

MANILA FOR STANDING RIGGING

FATHOMS	INCHES	FATHOMS	INCHES	FATHOMS	INCHES
60	6½	100	3½	300	2½
75	4½	100	3¼	300	2¼
90	4	200	3	400	2
90	3¾	300	2¾	300	1¾
				150	1½

Total: 2465 fathoms manila.

[1] Both "Gangs" are from the Company's Archives. The first ship is unnamed. *Lye Houghton*, 404 tons, was built by E. Russell at Pembroke, Maine in 1865 and owned by J. S. Winslow of Portland (data from *Bureau Veritas*, the French Lloyds, for 1869.)

APPENDIX B

Officials of the Plymouth Cordage Company 1824–1949

Treasurer

Caleb Loring	1824–34
James Harris	1834–37
Bourne Spooner [1]	1837–70
Charles W. Spooner	1870–82
Gideon F. Holmes	1882–1911
Francis C. Holmes	1911–38
Ellis W. Brewster	1938–

President

Nathan C. Keep	1867–75
John A. Dodd	1875–90
Caleb William Loring	1890–97
George G. Crocker	1897
Augustus P. Loring	1897–1936
B. Preston Clark	1936–39
Augustus P. Loring, Jr.[2]	1939–41
Ellis W. Brewster	1941–

Directors

Caleb Loring	1824–34
William Lovering, Jr.	1824–27, 1829–31

[1] Also Agent from 1824.

[2] Upon retiring as President, in 1941, Mr. Loring became the first Chairman of the Board of Directors.

John Dodd	1824–29, 1852–59
David Low	1824–30
Bourne Spooner	1824–70
Charles C. Nichols	1827–31
John Russell	1830–57
Elijah Loring	1831–46
James Harris	1831–38, 1841–50
Robert Gould Shaw	1834–53
Levi H. Marsh	1838–41, 1846–71
D. N. Spooner	1850–52, 1857–59
G. Howland Shaw	1853–56
Benjamin S. Rotch	1856–82
John A. Dodd	1859–90
Quincy A. Shaw	1859–69
Nathan C. Keep	1860–75
Charles W. Spooner	1870–82
Caleb William Loring	1871–97
Calvin S. Damon	1875–78
George G. Crocker	1878–1913
Schuyler S. Bartlett	1882–1922
L. A. Plummer	1882–85
William Rotch	1885–92
James E. Dodd	1890–95
Augustus Lowell	1892–1900
J. Whitney Austin	1894–1902
Augustus P. Loring	1897–1935
A. Lawrence Lowell	1900–03
William Lowell Putnam	1903–17
Charles H. W. Foster	1903–06

B. Preston Clark	1906–38
G. Glover Crocker	1913–43
Francis C. Holmes	1913–
Augustus P. Loring, Jr.	1913–
Charles G. Rice	1917–33
John Amory Lowell Blake	1922–37
Jerome A. Newman	1929–
Francis R. Clark	1929–44
Neil W. Rice	1934–
Ellis W. Brewster	1936–
Caleb Loring	1938–
Thomas D. Cabot	1943–47
William J. Kelleher	1944–45
Kenneth W. Marriner	1945–
Amory Coolidge	1945–47
Edwin G. Roos	1947–
Augustus P. Loring III	1947–

Clerk

Charles G. Loring	1824–31
Francis C. Loring	1831–45
Caleb William Loring	1845–84
Augustus P. Loring	1884–97
Theron A. Apollonio	1897–1939
Thomas W. Symons	1939–41
Charles MacKinnon	1941–

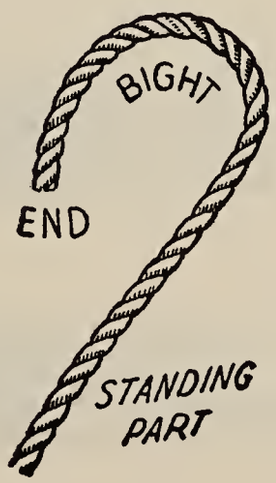
APPENDIX C

Useful Knots and How to Tie Them

ORDINARILY, when you want to put a rope to work, you have to tie a knot in it. And if you know only a few basic knots you can make your rope work much more efficiently. Knots are used to join two ropes together, or to shorten one rope — and to "tie up," tow, haul, hoist and support objects. Most of the knots shown here are fairly simple to master — a little practice and you'll be surprised what you can do with a rope.

Because often, several quite different knots might be used for the same job — it's important to know the general purpose of a knot before you decide on the best to use. For instance, if you wanted to secure a mooring line to a post with a very secure knot that you could leave in the end of your rope and use over and over again — you might use a bowline. But if you wanted to moor with a temporary but secure fastening that would untie quickly — you could use any one of a number of hitches. For that reason we've tried to classify very broadly under their general purposes, some of the knots, bends and hitches most commonly used.

TERMS USED IN HANDLING AND TYING ROPE



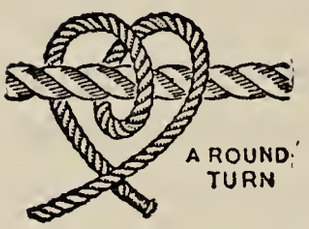
In knotting, a rope has three parts:

1. *The End* is the end of the rope which you are working when you tie a knot.
2. *The Standing Part* is the inactive length of the rope.
3. *The Bight* is the central part of the rope between the working end and the standing part.

An Overhand Loop is made by crossing the end *over* the standing part.

An Underhand Loop is made by crossing the end *under* the standing part.

A Turn is taken by looping the rope around an object — often another section of itself.

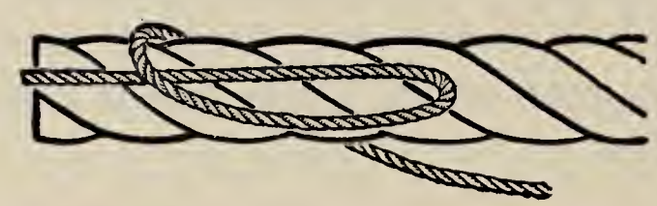


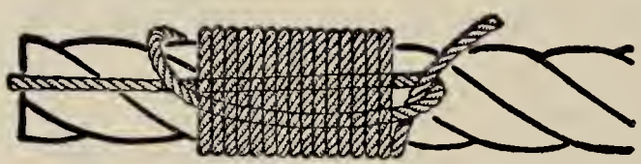
A Round Turn is taken by looping the rope *twice* around an object, as shown.

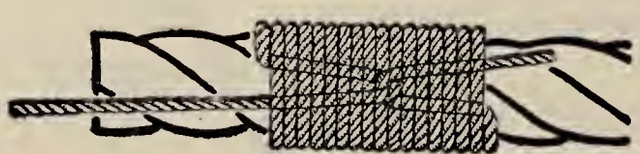
"*Over-and-Under*" *Sequence.* In tying a knot, whenever two sections of the rope cross each other, one must go *over* and the other, *under*. Be careful to follow this "over-and-under" arrangement exactly — otherwise you get either an entirely different knot or no knot at all.

"*Drawing Up.*" Once formed, a knot must be "drawn up" or tightened, *slowly and evenly* to make sure that all sections of the knot arrangement keep their place and their shape. Quick or careless tightening may result in a useless tangle.

WHIPPING KEEPS ROPE ENDS FROM UNRAVELLING







A good rope deserves good care. One way to keep your rope in good condition is to "whip" or bind the ends to prevent unravelling. In Splicing the separate strands of the rope are also whipped for the same reason.

To make the whipping, a fine yarn, marline or spunyarn, is generally used. The ordinary whipping is made by

placing the end of the yarn at the end of the rope and then laying a loop along the rope. You then wind the yarn tightly around both loop and rope, thus binding them together.

Wind to a distance roughly equal to the diameter of the rope you are whipping.

The whipping is finished by putting the winding end B through the loop — then pulling end A tight, until the loop is drawn back out of sight. Both ends are then cut short to make a near finish.

USE STOPPER KNOTS TO KEEP ROPE ENDS FROM SLIPPING THROUGH AN OPENING

End or Stopper Knots are generally tied to keep a rope end from slipping out of a hole or a pulley — also to stop a rope end from sliding through the loop of another knot and thus untying. Stopper Knots are often used to keep the ends of cord or twine from fraying.

THE OVERHAND KNOT

This is the simplest and smallest of all knot forms and the beginning of many more difficult ones. In general, use it only on small cord and twine, since it jams and is hard to untie, often injuring the fiber. To Tie: Make an overhand loop. Pass the end *under* and up *through* the loop. Draw up tight.

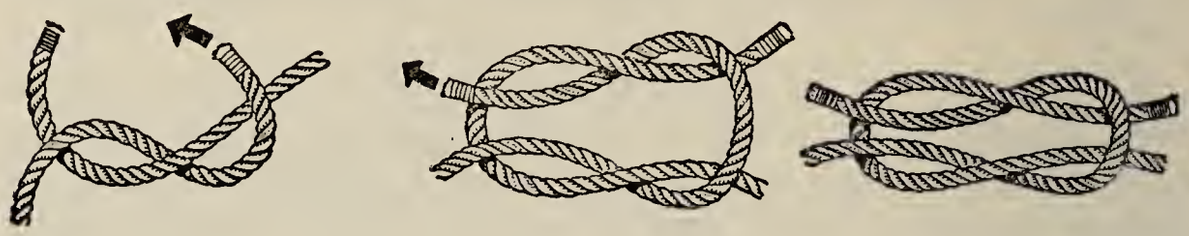
THE FIGURE EIGHT KNOT

This is much easier to untie than the Overhand Knot — is larger, stronger and does not injure rope fibers. It is the best knot to use to keep the end of a rope or "fall" from running out of a tackle or pulley. To Tie: Make an underhand loop. Bring the end around and *over* the standing part. Pass the end *under*, and then up through the loop. Draw up tight.

USE BINDING KNOTS TO TIE ONE OR MORE OBJECTS SNUGLY TOGETHER

THE SQUARE OR REEF KNOT

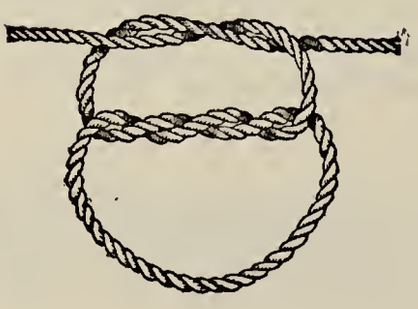
Used at sea in reefing and furling sails — ashore as the universal package knot for parcels and bundles. Though often used, it is a dangerous knot for tying two ropes together, since it unties easily when either end is jerked. To Tie: Pass the left end *over* and *under* the right end. Curve what is now the left end towards the right. Cross what is now the right end *over* and *under* the left. Draw up tight.



DON'T TIE THE WEAK GRANNY KNOT OR THE DANGEROUS THIEF KNOT

Remember that the Square Knot presents two ends lying together *under* one loop and *over* the opposite loop — while the Granny presents one end under and one over on *both* loops — and it's easy to avoid.

THE SURGEON'S KNOT



Often used for twine — chiefly to keep the first tie from slipping before the knot is completed. To Tie: With one end, take three turns about the other end. Bring both ends up. Pass one end over and under the other end. Draw up tight.

USE LOOP KNOTS TO HOLD TO AN OBJECT WHEN SECURITY COMES FIRST

A Loop Knot, like a Hitch, fastens a rope to another object. But usually, the Loop Knot is first tied in the hand and then

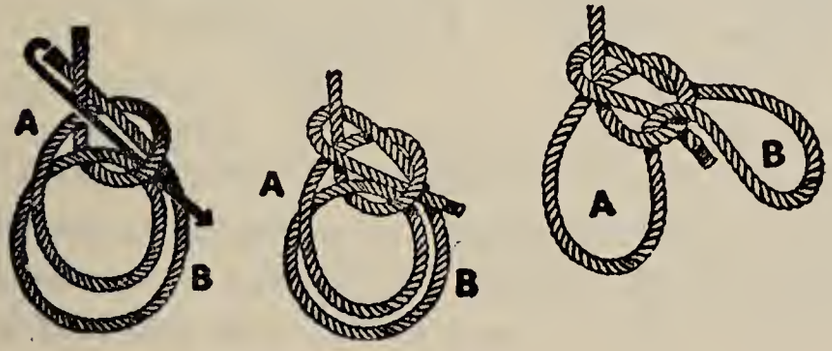
placed over the object — while the Hitch is tied directly around the object. In general, the Loop Knot is a more secure and permanent type of knot than the Hitch, because properly tied and drawn tight, it will not slip. Also, since it does not lose its shape, the same knot may be used many times over.

THE BOWLINE — USED FOR MOORING, HITCHING, LIFTING, AND JOINING

Sometimes called the "king of knots," the Bowline never jams or slips if properly tied. Generally tied in the hand, it can also be used as a hitch and tied directly around the object. To Tie: Make an overhand loop. Pass the end through the loop, then up behind the standing part — then down through the loop again. Draw up tight.

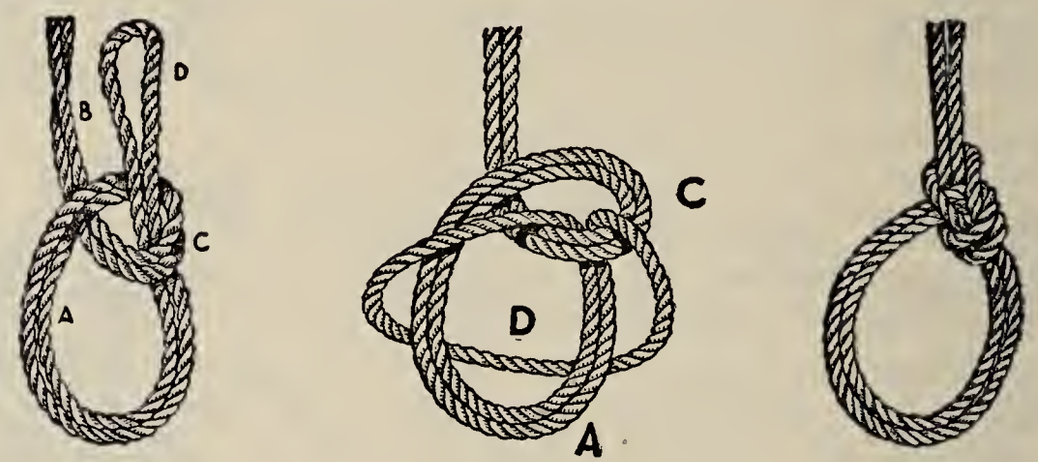
THE DOUBLE BOWLINE MAKES A GOOD SEAT SLING

To Tie: Make an overhand loop with the end held toward you, exactly as in the ordinary Bowline. The difference being that you pass the end through the loop *twice* — making *two* lower loops, A and B. The end is then passed *behind* the standing part and down through the first loop again as in the ordinary Bowline. Pull tight. Outside loop B goes under the arms — inside loop A forms the seat.



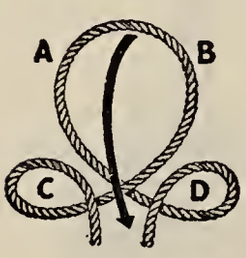
USE THE BOWLINE ON BIGHT TO LIFT
AN INJURED MAN

To Tie: Double the rope, make overhand loop C, and draw loop-end D up through it. Then pass loop-end D, towards you, down and over loop section A. Bring up in back until D lies behind standing part A. Draw loop D tight by a slow even pull on upper right side of loop A. To use, one leg is put through each loop and Loop D passed under arms.

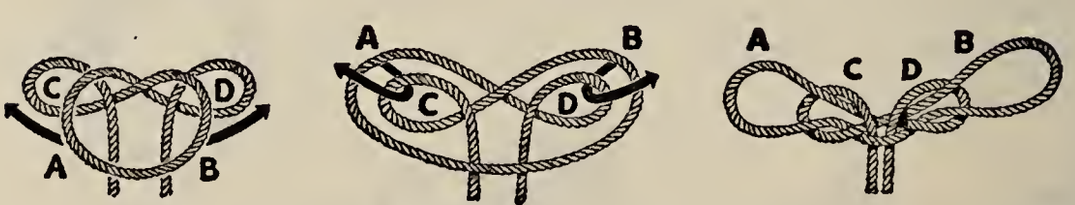


THE SPANISH BOWLINE
LIFTS A MAN OR SLINGS A LADDER

Form three loops, as shown, in any central section of the rope. Turn the large center loop A-B down. Enlarge it so that it encircles the smaller loops C and D. Put your hands through each of the small loops C and D, grasp each side of large loop A and B . . . and pull up through to complete the knot.



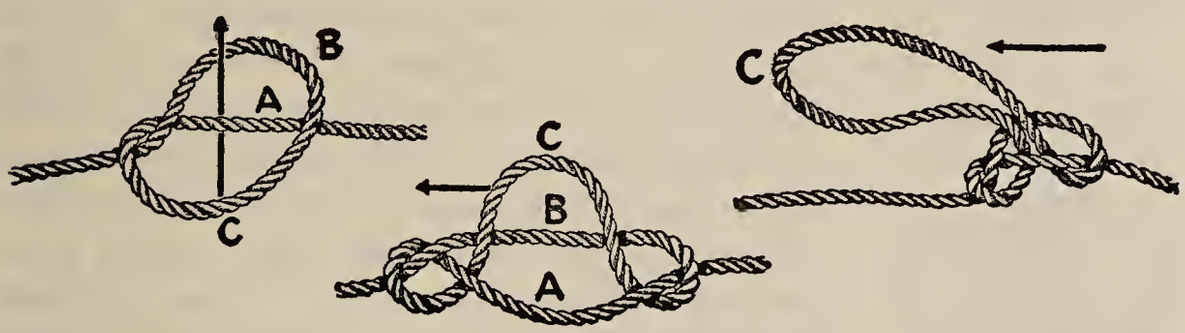
Used to lift an injured man like the Bowline on Bight, or to sling a ladder.



THE MAN HARNESS USED FOR HAULING, MOUNTAIN CLIMBING

This knot should be tied large enough to go around a man's shoulder, leaving both his hands free. It is used in tow and climbing ropes. To Tie: Make a loop in the rope and fold it

forward and slightly to the right to get a loop shaped like the one in the first sketch. Then take C up and under A and over B, as shown in the second sketch. A good hard yank on C, to the left, will finish the knot.



USE A NOOSE TO TIGHTEN A ROPE AROUND AN OBJECT

A Noose is a knot which draws up tight around an object when the rope is pulled. Any Loop Knot can be made into a Noose by pulling the bight of the rope a short distance through the loop.

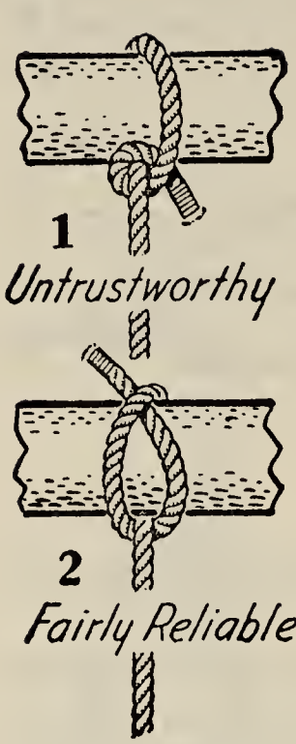
THE NOOSE, OR SINGLE RUNNING KNOT — USED AS A POST OR RING HITCH

This is the simplest form of the Noose and in very common use, probably because it is so easy to tie. It is weak, not too trustworthy, and often jams, which makes it hard to untie. It is tied like an Overhand Knot, but with a loop of the bight pulled through it instead of a single end.

USE HITCHES FOR TEMPORARY FASTENINGS THAT UNTIE READILY

Most Hitches differ from Loop Knots in being tied directly around an object — instead of first being tied in the hand and then placed over the object. Hitches are generally used as a speedy, temporary means of fastening to an object and many Hitches conveniently untie by themselves when the object is removed.

THE HALF HITCH, A BASIC KNOT FORM



The Half Hitch is generally used for fastening to an object for a right-angle pull. To Tie: Pass the end of the rope around the object and tie an Overhand Knot to the standing part. Figure 1 shows the Half Hitch tied with the end pulled close around the standing part. This is the first step in tying many more complicated hitches. But for use by itself, it is unsafe tied in this way, since it quickly slips untied. Figure 2 shows the Half Hitch tied with the end nipped under the turn of the rope some distance *away* from the standing part. This method is fairly reliable for temporary use — if the pull is steady and the arrangement is not disturbed.

HOW TO MAKE A LARIAT

(by Toots Mansfield, National Champion Calf Roper)

"First, unlay the strands in one end of the lariat for a short distance, tying the strands into a crown or Mathew Walker knot. This knot is simply to prevent the end of the lariat from slipping through the Honda Knot that forms the noose. To make the Honda, first tie a simple Overhand Knot in the bight of your lariat. Then tuck the end through it, leaving a round open loop. Make sure the end which forms the loop, leaves and re-enters the Overhand Knot from *opposite directions* (see diagram). Now your Honda Knot is completed, and to finish your lariat, simply pull the end through the Honda Knot, making a noose."

THE CLOVE HITCH
THE "GENERAL UTILITY" HITCH, ASHORE

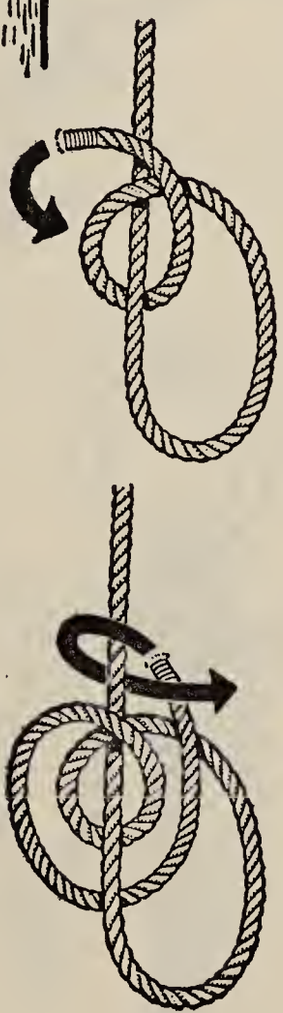
The Clove Hitch is a quick, simple method of fastening a rope around a post, spar or stake. It is sometimes called the "Builder's Hitch" because of its extensive use in fastening staging to upright posts. It can be tied in the middle or end of a rope. But since it has a tendency to slip when used at the end of a rope, the end should be half-hitched to the standing part for greater security.

To Tie: Make a turn with the rope around the object and over itself. Take a second turn around the object. Pull the end up under the second turn so it lies between the rope and the object. Tighten by pulling on both ends.

THE MIDSHIPMAN'S HITCH
USED FOR MOORING AND LIFE-SAVING

To Tie: Take a Half Hitch around the standing part. Directly above the Half Hitch and *within* the loop thus formed, take a turn. Then pass the end up through the loop and take another Half Hitch to the standing part. Tied in this way, the Midshipman's Hitch is adjustable — it can be slid to any position on the standing part where it will hold under strain.

If you ever fall overboard, tie it in the end of the rope that is thrown to you — passing it quickly under your legs, and making the Half Hitch to the standing part. Then, instead of taking the turn above the Half Hitch, take your turn *under* it, wedging it into position. Hold the free end tightly to the standing part while you're being pulled up — or if you have time, take the second Half Hitch instead.



THE COW HITCH AND VARIATIONS
FOR TETHERING, MOORING, HOISTING

The knot formation shown as the Cow Hitch, above, is tied in the *end* of a single rope. It is identical with that used in the Bale Sling Hitch which is tied in a continuous wreath or "sling" of rope. The Ring Hitch may be tied in either a sling or a doubled rope.

To Tie the Cow Hitch: Double the *end* of a rope to form an open loop. Reach through loop, grasping end and standing part, and pull them back through the loop. Place double loop thus formed over post and draw up tight.

To Tie the Bale Sling Hitch: Pass the sling under the object to be hoisted. Then pull the longer loop through the upper loop.

THE LARK'S HEAD

with a toggle or pin passed through the sides of the loop and behind the standing part. Often used as a boat fastening, it may be released instantly by pulling out the toggle.

THE RING HITCH
TIED IN A SLING
OR DOUBLE ROPE

NECK HALTER FOR HORSE OR COW

This simple method of tying a neck halter is in general use on the farm. It consists of one Overhand Knot tied in the end and a figure 8 loosely tied in the bight — far enough back to allow the length needed to go around the animal's neck. The knotted end is passed, as shown in the diagram, through the knot in the bight — which is then tightened. This forms a loop halter which will not slip and choke the animal and is easy to untie.

THE BLACKWALL HITCH
HOOK HITCH FOR A MODERATE LOAD

This is a practical Hitch for use if the end of a rope is short, but is never entirely trustworthy. It is satisfactory for a moderate load if the tension is never allowed to slacken.

It consists of a loop with the end of the rope passed under the standing part and across the hook. Under strain, the hauling part jams and holds the end against the hook.

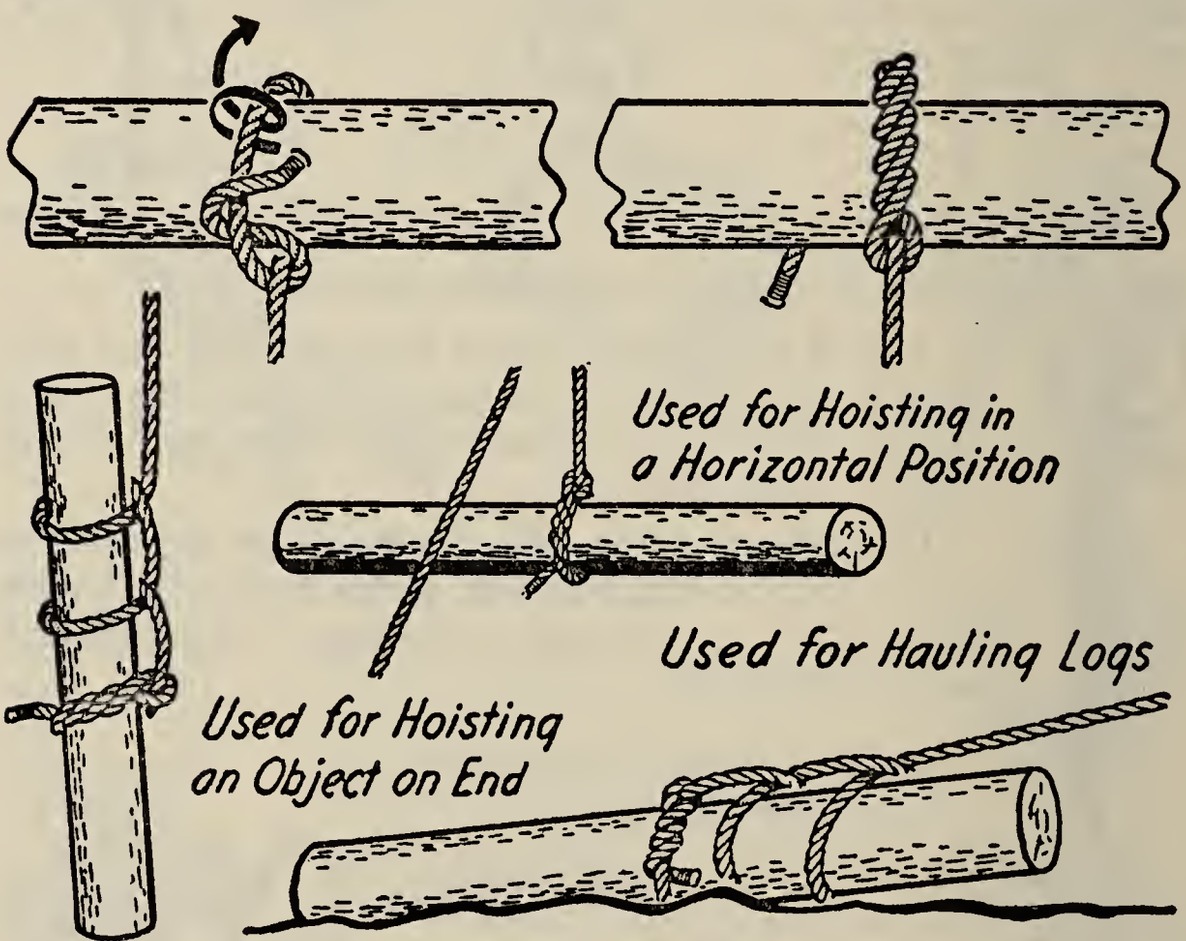
THE CATSPAW HOOK HITCH
FOR HEAVY LOADS

This is the Hook Hitch generally tied in a "sling" or continuous wreath of rope — for heavy hoisting. It does not jam and unties by itself when removed from the hook. It is tied by grasping two bights held well apart — and twisting each of them away from you. The two loops thus formed are then brought together and placed over the hook.

THE TIMBER HITCH
USED FOR TOWING AND HOISTING

This is a simple, convenient Hitch which does not jam, and comes undone readily when the pull ceases. It is used mainly to tow or hoist cylindrical objects, such as logs, spars, etc. — also in handling cargo, to hoist small crates and bales. It is used with one or more Half Hitches made with the standing part — for towing a spar or hoisting a timber on end.

To Tie: Pass a rope around the object and take a turn with the end around the standing part. Then, as shown in the diagram, twist or turn the end back on itself. Three turns back are sufficient and they should follow the lay of the rope.



USE A BEND TO TIE TWO ROPES TOGETHER

A Bend is tied when it is necessary to lengthen a rope by joining it to another. But it should be used for a temporary purpose only — if the joining is intended to be permanent, a splice is both stronger and safer. In general, Bends should be

tied only in two ropes of the same size, stiffness, and smoothness — otherwise the Bend is not dependable.

USE THE SHEET BEND TO JOIN LIGHT AND MEDIUM ROPES

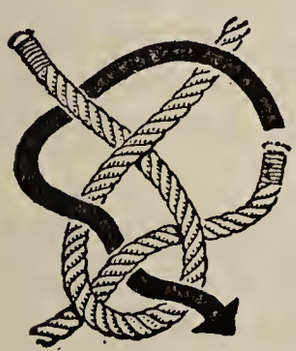
This is the common utility Bend used aboard ship, and unties easily without injuring rope fibers. While it can be tied in larger ropes, such as hawsers and cables, the Carrick Bend is preferable. Remember that its construction is like that of the Bowline — only instead of an end being tied to its own bight, one end is tied to the bight in the end of another rope — and you should find it easy to tie.

To Tie: Make an overhand loop with the end of one rope. Pass the end of the other rope through the loop thus formed, then up behind its standing part — then down through the loop again. Draw up tight.

THE CARRICK BEND — USED FOR HEAVY ROPES, HAWSERS, CABLES

The Carrick Bend is one of the strongest of knots. It cannot jam and it unties easily. Under strain it always draws up tight correctly — which is important because very heavy ropes usually cannot be fully tightened by hand.

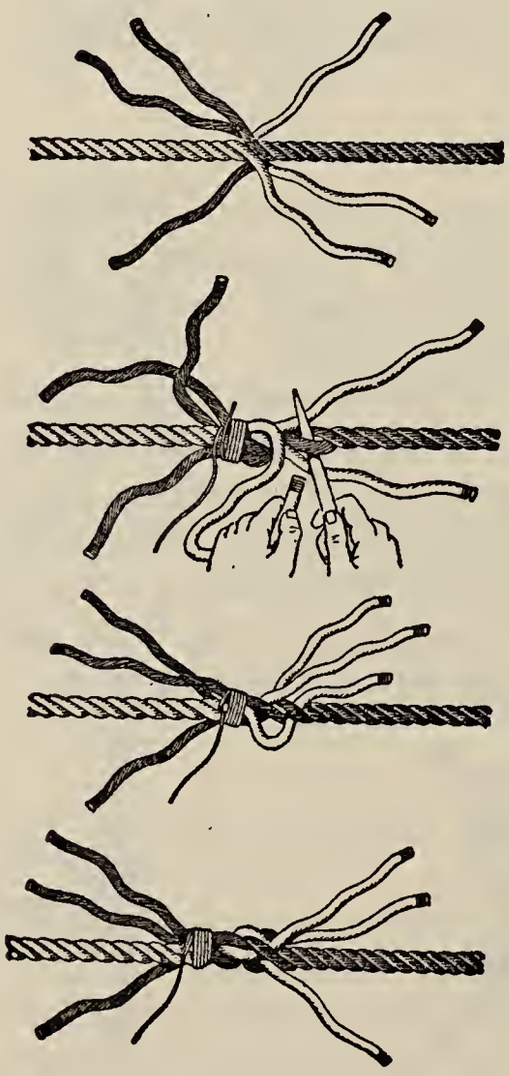
To Tie: With one rope-end form an underhand loop — with both the free end and standing part pointing away from you. Start the second rope end beneath both sides of the loop. Cross it over the standing part of the first rope, then under the free end of the first rope. Then over the left side of the loop. Cross it under itself — and let the second free end lie over the right side of the loop. Finish by seizing each end to the standing part.



THE FISHERMAN'S KNOT — JOINS FISHLINES, SMALL ROPE, TWINE

The Fisherman's Knot is very strong and in common use by anglers. It's also a very handy knot to know in case you're short of twine and must join two lengths together for tying up a package.

To Tie: Lay the two ends together — each pointing in the opposite direction. Then tie an Overhand Knot in the end of each — *around* the standing part of the other. When drawn up tight the two knots slide together and will not slip.



HOW TO MAKE A SHORT SPLICE

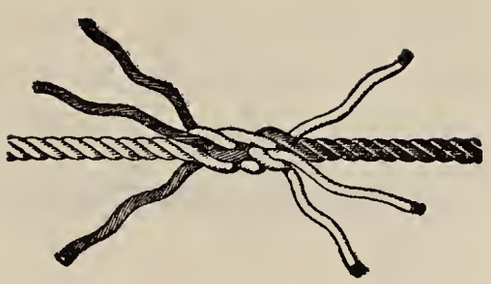
1. Unlay the strands of the ropes for a short distance, whip ends of the strands to prevent untwisting, and put together as in diagram above — alternating the strands from each end.

2. Now tie down one set of strands temporarily. Taking any strand of the opposite set, tuck it over and under one strand of the rope.

3. Tuck against the twist or "lay" of the rope. The tuck will go over one strand under the second, and out between the second and third.

4. Repeat the same operation with the other two strands from the same end of the rope.

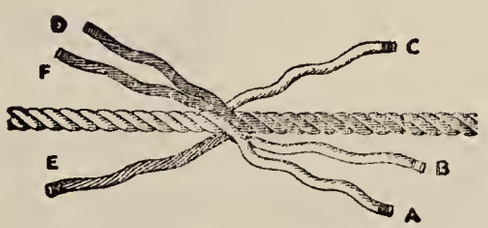
5. Remove tie from other strands. Repeat operation on their side of rope. Continue two more tucks for each of the six strands.



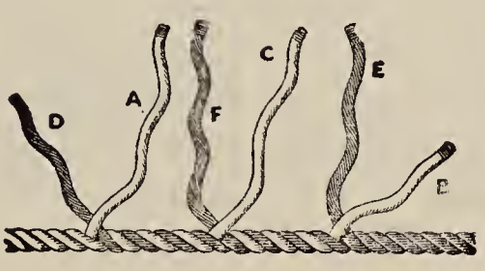
6. To finish, roll and pound rope on hard surface. Don't cut ends of strands off too close! (See upper sketch for correct appearance.)

For the tapered splice (see lower sketch) which gives better service, just take two more tucks with each strand, but before first tuck, cut out one-third the number of yarns from each strand. Then tuck. Now, cut strands again, removing one-half of the remaining yarns — and tuck again.

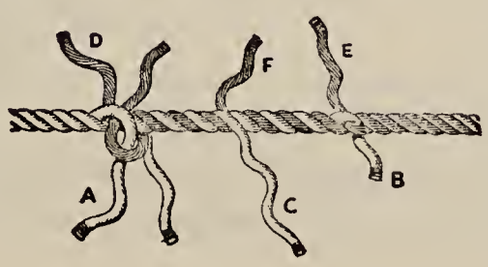
HOW TO MAKE A LONG SPLICE



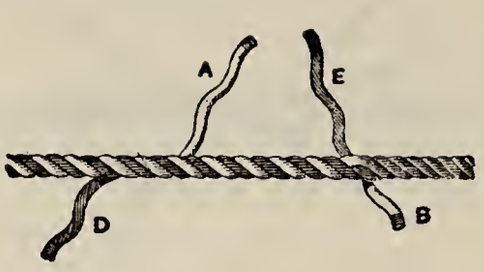
1. This splice is good for any pulley work except for power transmission. First, unlay the end of each rope about 15 turns and place the ropes together, alternating the strands from each. Then —



2. Start with any opposite pair, unlay one strand and replace it with a strand from the other part. Repeat operation with another pair of strands in the opposite direction. Then —



3. Tie each pair of opposing strands with an overhand knot as "B" and "E" above, tuck each strand twice, as in the short splice,



and then twice more as in the tapered splice. Or — halve each strand (see "A" and "D") and tie with an overhand knot before tucking. By this latter method a smaller splice results — but with considerable sacrifice of strength.

4. Finally roll and pound well, then cut the strands off close to the rope.

THE EYE SPLICE

An Eye Splice is used in the end of a rope for mooring and in place of the Honda Knot for making a Lariat. The Eye Splice is made exactly like the Short Splice, except that it is made with one rope. The end after being unlaid is bent around to form the eye, and is spliced into its own strands of the standing part.

THE TRANSMISSION SPLICE

Here we are working with a *four*-strand rope with a heart. An 8-foot splice is about the proper length for a ¾″ diameter rope. Larger ropes should be given proportionately longer splices, up to 16 feet for a 2″ diameter rope. *This example* is for a 1¼″ rope. First mark the rope to length allowing 6 to 10 feet on each end. This will make a 10- to 16-foot splice. Unlay each end back to the markers, then twist the strands together, figure I.

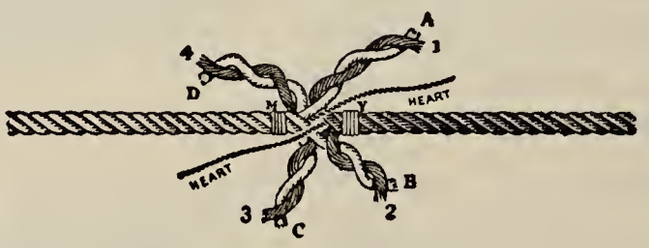


FIG I.

Cut marker "Y," unlay strand "1" five feet, lay strand "A" in its place; unlay strand 3 two feet, lay strand C in its place; cut

hearts just as they meet. Then, cut marker "M," unlay strand "D" five feet, lay strand "4" in its place; unlay strand "B" two feet, lay strand "2" in its place; cut off all strands about eighteen inches long for convenience in manipulation. The rope is now as Fig. II.

FIG. II

As the strands are laid in, great care should be used to maintain the original twist in each. Each pair of strands is now successively subjected to the following operations: Take strands "B" and "2" for example: unlay them each three turns, split, and whip one end of each as "B^1" and "2^1" in Fig. III.

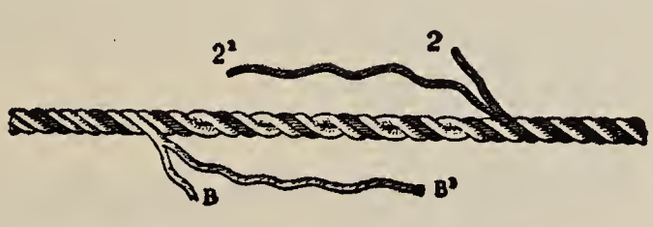


FIG. III

Lay back the split strands "B^1" and "2^1" and tie in a simple knot. Fig. IV.

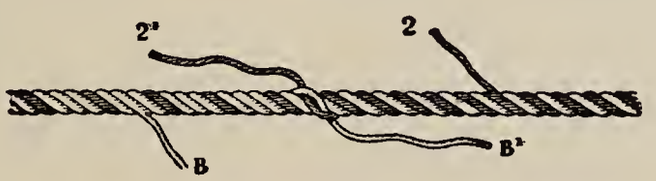


FIG. IV

With a fid or marlin-spike raise "B^1" and tuck "2^1" around it until it reaches "B." Raise 2^1 and tuck "B^1" around it until it reaches 2. Split "B" and pass 2^1 through it and through center of rope; split 2 and pass "B^1" through it and through center of rope. Do not put much twist into the part which is being tucked around; try to lay a smooth, even course of about the same angle as the original strands. These half strands should not pass around more than four times before being drawn through the rope. Fig. V

shows "B¹" raised with 2¹ being tucked around it, and end "B¹" passed through 2 and through rope ready to be drawn tight.

This operation is called tucking, or locking the strands. If these tucks or locks are not made small and firm, they will wear more rapidly than the rest of the rope and the splice will fail. When the strand is split, preparatory to making this lock, it is common practice to make the parts used for tucking two or three yarns smaller. In this manner, the lock is made small and wear reduced.

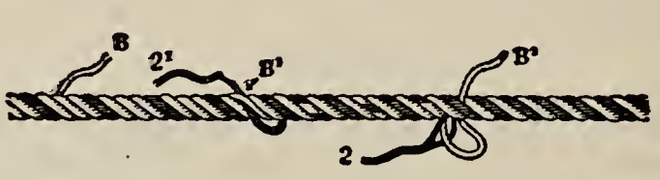


FIG. V

Cut off ends of the strands, leaving one or two inches projecting, so that as the working tension is put upon the rope, the yarns may draw in somewhat without being loosened. Fig. VI shows completed section of splice.

FIG. VI

INDEX